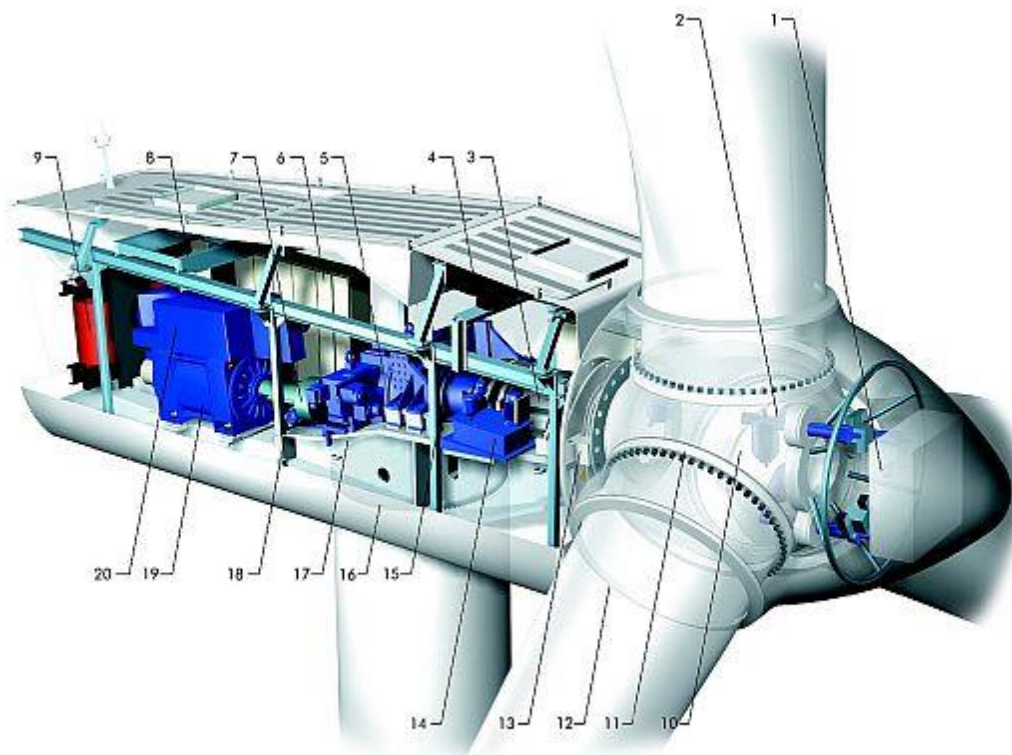


HEALTH AND SAFETY PLAN BOP

Mod. I General Description

WIND FARM ENERGÍA EÓLICA DEL SUR- POLÍGONO
JUCHITÁN

IN JUCHITÁN DE ZARAGOZA, OAXACA, MÉXICO.



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00	First Edition

IMPORTANT: *Whenever there is work that is NOT included in the Health and Safety Plan and/or considered in the plan's risk assessment, we shall proceed as follows:*

- ✓ *Work instructions shall be made by the company that is going to perform the work.*
- ✓ *The risks involved in the work shall be assessed and a risk assessment shall be drawn up by the same company*
- ✓ *Finally, an Appendix to the Health and Safety Plan, including the work instruction and risk assessment, shall be completed. In some cases, a single document may include the instructions and assessment and therefore, it functions as an Appendix. It must always be attached to the Safety Plan and must be approved by the Plan's writer and any legal figure if applicable pursuant to local legislation.*

1. REPORT

1.1 AIM OF THIS HEALTH AND SAFETY PLAN

This Health and Safety Plan establishes the revisions that must be made during the works period with regard to the prevention of work-related accidents and illnesses, specifying the preventive measures and technical protection features that are used to control and reduce said hazards, as well as the precautions that must be taken accordingly in the proper health and safety conditions in future works. It shall define some basic guidelines for the construction company, as well as the subcontractors and freelance professionals that may participate in the building process, in order to facilitate the drafting of the corresponding health and safety plans, enabling them to carry out their duties in the field of occupational hazard prevention, and the implementation thereof.

1.2 SCOPE OF APPLICATION

This Plan shall enter into force on the work's start date and remain valid until the handover of the farm to the owner.

The application thereof shall be binding for all VESTAS staff and those under the authority of the subcontractors, in order to perform work within the Work Site area, regardless of the contractual conditions regulating their participation in the Work.

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1.3 MODIFICATION TO THE PLAN

The Safety and Health Plan may be modified by the contractor depending on the project implementation process, the progress of the jobs, any potential incidents and any reasonable suggestions and alternatives put forward in writing by those involved in carrying out the works, as well as by any individuals or bodies responsible for prevention matters and staff representatives in said companies.

The modifications approved shall be included in a new revised Plan that shall be issued to all the workers in due course, becoming mandatory at the work site as from that time onwards for any personnel performing any tasks on such premises.

The measurements, quality assessments and appraisals contained in the safety and health study budget can be modified or replaced by other alternatives within this Health and Safety Plan, after due technical justification and provided that this fact does not purport a reduction in either the total amount or in the protection levels set out in the study.

Any changes to the Health and Safety Plan must always have the express approval of the area's local safety manager and if legally applicable, that of the safety coordinator or any other figure pursuant to local legislation.

2. CHARACTERISTICS OF THE PROJECT

2.1 .PROJECT INFORMATION

Name: Energía Eólica del Sur - Polígono Juchitán

Site: Juchitán de Zaragoza, Oaxaca, México.

Client or Developer: Energía Eólica del Sur

Project Management: To de define (TBD)

Main Contractor: TBD

Safety Plan Author: Aoki Miyasaki Torres (AOMTO)

Installation Supervisor: TBD

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2.1.1 PROJECT DESCRIPTION.

The Wind Farm named “Energía Eólica del Sur-Polígono Juchitan” shall be located in Juchitán de Zaragoza, Oaxaca, Mexico.

The wind farm is composed of:

1. 60 wind turbines of 3 MW power, creating a total installed power of 180 MW
2. Access roads to the installation and to each of the wind turbines.
3. Underground medium voltage electrical and control lines between the wind turbines and the farm's substation.
4. Farm substation, where the transforming equipment shall be located.
5. Control building.
6. Anemometer Tower. (If the scope of the contract includes it).

The infrastructures required to implement this project are composed of the following parts:

CIVIL ENGINEERING INFRASTRUCTURES

- Access roads, paths and platforms for each of the wind turbines.
- Wind turbine foundations. Assembly and leveling of the collars or bolt cages.
- Drain channeling.
- Embedded pipes.
- Auxiliary resources.
- Transformer Substation Control Building.

ELECTROMECHANICAL INFRASTRUCTURE

- Underground medium voltage network for the connection of the wind turbines' switch gears to the Wind Farm's Substation.
- 0.69/34.5 kV transformers inside each wind turbine.
- Transformer Substation 138/34.5 kV.
- Farm and substation's general grounding network.
- Each wind turbine's grounding network.

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WIND TURBINES (INSTALLATION AND ASSEMBLY).

- Loading and unloading of material
- Transportation of material
- Storage of material
- Preparation of turbine installation
- Preparation and assembly of tubular tower
- Preparation of the nacelle
- Hub installation
- Mounting of nacelle on tower
- Horizontal mounting of individual blades
- Installation of HV cable on tower
- Installation of HV cable in transformer
- Installation of wiring
- Installation of service elevators
- Energization and start-up
- Connection to SCADA
- Outside repair tasks

WIND TURBINE CHARACTERISTICS:

60 wind turbines, Vestas model V90-3 MW to be assembled.

The wind turbines shall be connected via the number of circuits that are required with buried conductors. Power evacuation shall be performed via 34.5 kV, underground cabling that shall connect each of the farm's circuits to the evacuation line directed towards the Wind Farm's substation.

Generation of electricity is performed at 690 V and is transformed to 34.5 kV in each turbine's transformer, where switchgear and connection equipment are also housed in order to make the cable inlets and outlets for the cables that connect the machines to each of the circuits mentioned previously.

The Medium Voltage network for each interconnection circuit is designed to collect the electricity generated by the wind turbines that make up the network. It shall run underground along the side of the roads linking each of the wind turbines with the start of the evacuation line.

The transformers for each circuit shall be interconnected via three dry insulation unipolar RHZI-type cables. On some occasions, the civil engineering cannot be performed following all the technical specifications described in the management project, for different reasons such as environmental restrictions, archeological

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findings, etc. In order to compensate for these deviations, primarily, monitoring must be performed from the sales stage to the final completion of the CE work, endeavoring to correct the deviations wherever possible. As a final measure, a report must be performed compiling all the deviations and their proposed solutions, required resources, preventive measures, etc..

CHARACTERISTICS OF THE WIND FARM ACCESS ROADS:

The cants have been adapted to meet the wind turbine manufacturer's recommendations

**See CE specifications attached to the contract.*

The planned Civil Engineering aims to prepare the installations, thus optimizing technical performance and the area's environmental quality, and includes:

- Access paths to each of the wind turbines.
- Foundations for wind turbines.
- Cabling conduits.
- Grounding system conduits.

2.1.1.1 ACCESS PATHS.

The main purpose of the road network needed to access the wind turbines is to minimize damage to the ground where such roads are located. This is why standard road sections are created, which may appear to or produce inconveniences whilst the work is executed Furthermore, the aim at all times shall be to use the pre-existing road network in the area, ensuring that the impact produced in the area is kept to a minimum.

The new roads have been designed by grading, in order to ensure minimal earth works, and therefore a lower impact on the environment. Therefore, at times a decision was taken to separate the road from the wind turbine, building a fork leading to the wind turbine in order to avoid excessive digging or creation of banks.

Where feasible, part of the road shall be sloped, using materials from the earth works to compensate the volumes as much as possible, minimizing transportation of earth to the landfill site.

The main characteristics of the new roads are as follows:

- Total width of the road: 5 meters on 6.90 m platform.
- Cross-section slope: 2 %
- Maximum slope: 10 %. If the slope were greater than this value, a procedure investigating the operational and preventive measures to be taken shall be performed in order to reduce the risk

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to a minimum or eliminate it all together. This procedure and the corresponding risk assessment must be attached to this safety plan.

- Paving: 25 cm of artificial gravel, 50 cm of natural gravel, compacted at 95 % of the M.S.
- Drainage: Via 1 m wide and 0.5 m deep ditches. At the low points relative to the platform there are pitches designed with concrete pipes.
- Earth clearance: 1/1 Slope, sowed via hydroseeding.
- Banks: 3/2 Slope, sowed via hydroseeding.

When the paths are close to livestock fencing, cattle guards shall be used in order to facilitate the normal passing of vehicles and livestock.

Furthermore, in the areas where it is necessary to disassemble pre-existing fences, a topographic survey shall be performed, and once the work is completed, the fences shall be returned to their original condition.

2.1.1.2 WIND TURBINE ASSEMBLY PLATFORMS.

The space required for the assembly of the wind turbines is determined by the surface occupied by the cranes and the space required to complete all operations, including the storage area for the main components. Therefore, an assembly platform shall be required for each wind turbine to be assembled.

The assembly platform for each wind turbine shall be according to the recent VESTAS Civil Engineering Specifications document. In any event this may be subject to change, or environmental, archeological, etc. restrictions. These modifications must be justified via a final report where the deviations and the actions to be carried out are highlighted.

2.1.1.3 CABLING CONDUITS.

The wind turbines shall be connected via two circuits, with buried 34.5 kV insulation conductors. Power evacuation shall be performed via underground cabling that will connect each of the farm's circuits to the evacuation line leading to the wind farm's substation.

Generation of electricity is performed at 690 V and is transformed to 34.5 kV in each turbine's transformer, where switchgear and connection equipment are also housed in order to make the cable inlets and outlets for the cables that connect the machine to each of the aforementioned circuits.

The Medium Voltage network for each interconnection circuit is designed to collect the electricity generated by the wind turbines that make up the network. It shall run underground along the side of the roads linking each of the wind turbines with the start of the evacuation line.

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2.1.1.4 GROUNDING SYSTEM CONDUITS.

Conduits shall be used for the cabling and the excavations of the wind turbines' foundations upon which the conductor's framework shall be positioned. The grounding grid shall be made of nude 50-mm² gauge copper cable and shall link the grounding system for each wind turbines' transformers to the M.V./H.V. Substation, so that the entire electrical infrastructure forms an equipotent unit.

The grounding cable shall be buried underground, alongside the Medium Voltage network power cables.

The unipolar cable screens shall be grounded at both ends. Therefore, in the event of an outlying grounding defect, the transmission of hazardous voltages shall be avoided.

2.1.2 TRANSFORMERS.

Each wind turbine is equipped with a transformer inside the base of the tower, where the Low Voltage power lines shall arrive, secured in a tray along the length of the shaft.

- Each transformer is composed of the following elements:
 - Medium Voltage mainframe.
 - Transformers.
 - Switchgear
 - Remote control elements and resources.
 - Safety equipment.
- Generation of electricity is performed at 690 V and is transformed to 34.5 kV in the transformer where switchgear and connection equipment are also housed in order to make the cable inlets and outlets for the cables that connect the machine to each of the aforementioned circuits.
- The Medium Voltage network for each interconnection circuit is designed to collect the electricity generated by the wind turbines that make up the network. It shall run underground along the side of the roads linking each of the wind turbines with the start of the evacuation line. The transformers for each circuit shall be interconnected via three dry insulation unipolar RHZI-type cables.
- Access to the transformer is achieved via the door located in the base of the wind turbine tower and it shall be naturally ventilated via the shaft.

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2.2 LOW AND MEDIUM VOLTAGE INFRASTRUCTURE.

2.2.1 OVERVIEW

The Medium Voltage network for each interconnection circuit is designed to collect the electricity generated by the wind turbines that make up the network. The transformers for each circuit shall be interconnected via three dry insulation unipolar RHZI-type cables. The conductor sections in each segment of the circuit shall be adapted to the maximum expected charges, in normal service conditions, that flow through each segment between wind turbines. The maximum capacity used in each of the cabling sections shall not exceed 90% of the cable's nominal capacity, pursuant to the manufacturer's recommendations for the specific laying conditions for each of the circuits. The final cabling sections chosen are optimized based on an economic analysis of power losses and the cost of the selected cable section.

2.2.2 CONDUCTORS.

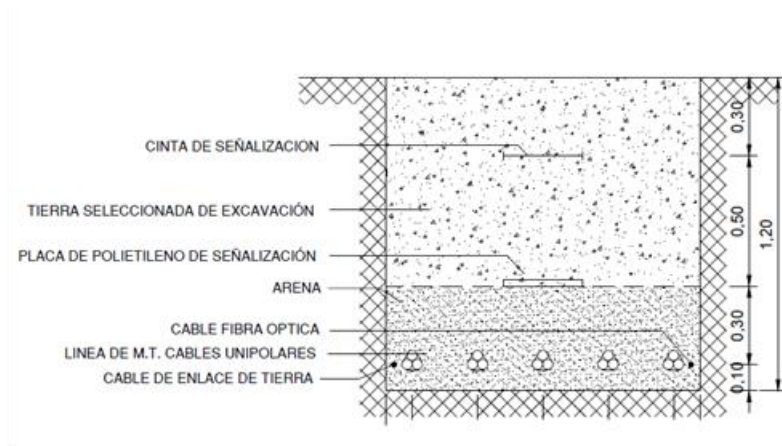
- The cables used to connect the wind turbines to each other and with the substation shall be dry insulation unipolar aluminum RHZI-type cables.
- The cable insulation is an "ethylene-propylene" synthetic polymer mix, a material that is completely moisture resistant and has a rubber structure. It has a high resistance to thermal aging and partial discharges.
- The cable shall be screened. The screen is made of a metallic cover of copper tape or thread. It is applied on the outer conductor layer, which is applied beforehand on the insulation.
- The conductors are formed of round compact aluminum wire and meet the specifications of the UNE 21022 and CEI 228 standards.
- The semiconductor layer that covers the conductor has two functions: to prevent ionization of the air and to improve the distribution of the electric field on the conductor's surface. All the conductors meet the specifications established under current international standards, in accordance with the voltage and service conditions for which they are intended. The laying and installation shall be performed in ditches and shall generally be completed as per the following criteria:
- At the base of the ditch the grounding conductor shall be placed, and on top of the conductor, a 100 mm-thick layer of washed fine river sand. Subsequently, the medium voltage cables shall be positioned. Once laid, another layer of fine river sand, this time 150 mm thick, shall be spread and shall be appropriately compacted. On top of this layer, a protective hollow brick layer and plastic signaling tape shall be



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positioned along the entire length, which shall protect and warn of the existence of medium voltage electric cables underneath said layer.

- Subsequently, the ditch shall then be filled with material from the excavation, free of stones, branches and roots, in layers that are appropriately compacted. The last layer shall be of topsoil from the surface layer of the excavation that has been appropriately stored, in order to allow the area's natural vegetation to recover as soon as possible.



2.2.3 GROUNDING

2.2.3.1 GROUNDING OF THE WIND TURBINES

The grounding grid shall be made of nude 50-mm² gauge copper cable and shall link the grounding system for each wind turbines' transformers to the M.V./H.V. Substation, so that the entire electrical infrastructure forms an equipotent unit. The grounding cable shall be buried underground, alongside the Medium Voltage network power cables. The unipolar cable screens shall be grounded at both ends. Therefore, in the event of an outlying grounding defect, the transmission of hazardous voltages shall be avoided.

2.2.3.2 GROUNDING OF FARM CONNECTION

The design of the wind farm's grounding network is based on a single grounding system, and therefore, each of the turbines' grounding systems are connected to each other and to the farm's substation, via a 50-mm² gauge copper conductor, forming the equipotent grid.

Said conductor's connection to each turbine's grounding network shall be made within the tower, where it shall be accessible for inspection when necessary.

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2.3 SYSTEM REGULATION AND CONTROL.

- The wind farm's monitoring and control system is formed of a series of instruments, electronic devices and infrastructure, IT system. These components are used to measure, transmit and process and display operational data from the facility.
- The purpose of the monitoring system is to make the information collected available in a convenient manner to the staff tasked with the farm's operation and to the owners and to provide data for the analysis of the facility's performance. In addition, it enables the installation to be monitored easily from remote locations via the use of telephone data communication systems.
- The monitoring system is supplied with all the wind farm's internal communication systems. The mainframe computer must be installed in a building, along with the modem for external communication, the printer, operating system and monitoring software.

2.3.1 SYSTEM COMPONENTS

2.3.1.1 WIND TURBINES

Each of the turbines' control systems includes the equipment and the communication circuits to exchange information.

2.3.1.2 ELECTRONIC SUBSTATION

In order to collect information regarding the operating parameters of the high voltage facility, measuring devices are located in the substation, as well as electricity meters and alarms (normally not all included).

2.3.2 CONTROL BUILDING

- The building shall have the standard openings and facilities for this type of construction.
- The building shall be constructed in masonry, set on the corresponding foundation. The exterior finish shall match that used on other buildings in the area. The building shall be equipped with a water storage system, as well as a septic tank for wastewaters to be treated.
- Fire protection consists of the corresponding extinguishers, ionic detectors and a series of manual extinguishers located in strategic positions.
- Inside, there shall be the following rooms: switchgear room, control room, a common area, office, toilet and changing room, as shown in the attached plans.

2.4 BUDGET:

The budget for the implementation of the project amounts to information no available.

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2.5 COMPLETION TERM:

To be define (TBD)

2.6 MANPOWER:

Based upon the Project implementation planning, human resources have been estimated as follows:

- During the ditch digging stage and positioning of the electric cables: TBD operators
- Civil engineering: TBD operators
- During the assembly and electrical installation phase: TBD operators
- During the start-up stage: TBD operators

The main specialties participating in the work are:

- Truck and Transport Vehicle drivers
- Earthworks machinery drivers.
- Mobile crane and crane truck driver(s).
- Civil engineering builders
- Underground electric line assembly personnel
- Aerial electric line assembly personnel.
- Wind turbine and accessory electromechanical assembly personnel
- Weather station tower assembly personnel
- Maintenance technicians for start-up
- Other staff for various site control and organization tasks

Each company working on site will be responsible for its own workers and outsourced personnel, guaranteeing that:

- They have the required competence, either by training or experience, to engage in the tasks involved in the position.
- They have received detailed information and training through this Health and Safety Plan and have been informed of the preventive measures to be taken in their individual jobs when using the machinery and ancillary equipment, as well as the steps to be taken in order to mitigate those risks arising from potential emergency situations on the work site, as mentioned in this Plan.
- They are subjected to health check-ups according to the occupational hazards to which they might be exposed according to the law in force.
- They have the necessary collective and individual protective equipment mentioned in this Plan to perform their duties in a safe manner, and have been sufficiently trained on their usage.

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2.7 VEHICLES, MACHINES AND AUXILIARY RESOURCES

Based on the analysis of the work phases described in the description of the works, the following pieces of equipment are deemed applicable in order to render the implementation plan feasible.

All of the material must be certified and kept in good conditions. VESTAS shall require all of its subcontractors to provide equipment bearing the relevant declaration of conformity and compliant with the local legislation, which has undergone appropriate preventive maintenance in order to keep high safety standards.

Machinery leased under short or long term contracts must have been appropriately maintained following the manufacturer's specifications and must be in a good state of repair, guaranteeing high safety levels. No machinery in a poor state of repair will be allowed on the work site.

An assignment or lease contract shall be signed between the lessor and the lessee to guarantee the fulfillment of the abovementioned requirements. This procedure will also be carried out in the case of assigning equipment and machinery owned by VESTAS to the subcontractors or in the event of equipment temporarily leased by VESTAS to rental companies. In this case, it should be verified that the lessee allows such equipment to be assigned to other companies. Otherwise, its use by outsourced personnel is prohibited.

The following work equipment is expected to be used:

MACHINERY	
Heavy Machinery	Lightweight Machinery
<ul style="list-style-type: none"> • Water tank truck • Asphalt mixture truck • Transport truck • Agglomerate transport truck • Concrete mixer • Boom truck • Agglomerate spreader • Road surface marker • Motor grader • Loader • Backhoe loader • Road roller • Vibrating metal roller • Self-supporting crane 	<ul style="list-style-type: none"> • Manual steamroller • Paving cutter • Electric concrete mixer • Electric concrete breaker • Pneumatic concrete breaker • Concrete vibrator • Chainsaw (pruning and felling tasks) • Electric clamping equipment • Hydraulic clamping equipment • Electric, autogeneous and oxycutting welding equipment.

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MACHINERY	
Heavy Machinery	Lightweight Machinery
<ul style="list-style-type: none"> • Self-loading truck. • Telescopic handler. • Lifting platforms. • Trailer truck 	
Tools-Machine Tools	Auxiliary Resources
<ul style="list-style-type: none"> • Angle Grinder • Table saw • Drill • Manual tools 	<ul style="list-style-type: none"> • Compressor • Ladders • Scaffolding • Generating set • Hoisting items

When using all of the vehicles, machines and auxiliary resources, the preventive measures derived from the evaluation of the assembly work and included in this Health and Safety Plan must be followed, as well as the specific standards set out in the Bidding Terms.

2.8 HYGIENE AND WELFARE FACILITIES

Temporary prefabricated metal modules with thermal and acoustic insulation will be provided for workers. They will be simple but suitable facilities and will be cleaned every day.

These modules will be set up by each company involved in the Project at the start of their activities and must be removed once they have been completed.

The modules shall comply with the requirements established in "The building Operations and Works of Engineering Construction (Safety, Health and Welfare) Regulations, PART XIV : Health and Welfare

3. ACCESSIBILITY

To access the wind farm site, as well as for the construction and maintenance thereof, a suitable road network is required. For the planned farm the existing extensive road network shall be used, which is in a good state of repair, reducing the environmental impact as well as costs. New paths shall be built in addition to these roads, allowing access to all the elements composing the farm.

In the layout of these new roads, impact on the ground where they run shall be minimized. Therefore, standard or characteristic layout sections that may appear limited or produce some inconveniences

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during the project implementation are used. All these aspects have been assessed, and the benefits gained from this reduction in intervention far outweigh the inconveniences that it may produce.

3.1 ACCESS PATHS

The network of roads that enable access to the farm site are called access paths, in order to differentiate them from the service roads, which are those that, once on site, connect each of the farm's elements.

3.2 SERVICE ROADS

The service roads are the internal roads to the farm that allow access to each of the elements that form the park. Their layout, on those sections that do not make use of existing tracks, shall be devised combining the minimum length with the minimum impact to the vegetation and surroundings. Existing tracks shall be used as service roads in all sections where it is possible, including areas in which it is not the shortest route, minimizing impact on the surroundings. In those areas where it has been necessary to build new tracks, the appearance of banks has been avoided at the points where the ground is most irregular due to them being harder to integrate into the landscape.

3.3 SPECIAL AREAS

In the event that areas with unfavorable geotechnical characteristics, landslides, muddy ground, etc., are discovered, which may affect the safety of the work or prevent the completion of *unusual labor*, an appendix to the safety plan must be developed for this type of work, which covers all the work to be performed as well as a risk assessment.

4. MINIMUM SAFETY REGULATIONS THAT SHALL BE APPLIED ON SITE.

The requirements set forth in this summary shall be applied whenever the site's or activity's characteristics or circumstances or any hazard require it.

4.1 STABILITY AND SOLIDITY

- The stability of the materials and equipment, and in general, of any item that may affect the health and safety of the workers during any kind of movement, must be achieved appropriately and safely.
- Access to any surface that has materials that do not offer sufficient resistance shall only be authorized if suitable equipment or resources are provided so that the work is carried out safely.

4.2 ENERGY SUPPLY AND DISTRIBUTION INSTALLATIONS

The facilities shall comply with that set forth in the specific regulations. In any case, barring specific provisions of the aforementioned regulations, said installations must meet the conditions indicated in the following points of this section.

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- The facilities must be designed, completed and used in such a way that there is no danger of fire or explosions and so that they are duly protected against direct or indirect contact electrocution hazards.
- The project, completion and selection of material and protective equipment must take into consideration the type and power of the electricity supplied, the conditions of the external factors and the competence of those who have access to the facility.

4.3 EMERGENCY EXITS AND ROUTES:

- Emergency exits and routes must remain clear and shall lead as directly as possible to a safe area.
- In the event of danger, all work sites must be able to be evacuated quickly and in the highest safety conditions for the workers.
- The number, distribution and dimensions of the emergency exits and routes shall depend on the use of equipment and the site's and premises' dimensions, as well as the maximum number of people who can be present in them.
- The specific exits and routes must be signaled.
- Emergency exits and routes, as well as the traffic routes and doors providing access to them must not be obstructed by any objects so that they can be used without difficulty.
- In the event that the lighting system breaks down, the emergency exits and routes shall have safety lighting with sufficient power.

4.4 FIRE DETECTION AND FIGHTING

- According to the characteristics and dimensions of the site and used of the equipment present, the physical and chemical nature of the substances or materials and the number of people that may be present, there shall be a sufficient number of fire fighting devices, and if necessary detectors and alarm systems.
- Said devices must be checked and maintained regularly according to applicable legislation. Tests and appropriate drills shall be performed regularly.
- Non-automatic devices must be easily accessed and used.

4.5 VENTILATION

- Taking into consideration the work methods and physical loads imposed upon the workers, they should have access to sufficient quantities of fresh air.
- If a ventilation system is used, it shall be maintained in good working order and shall not expose workers to air currents.
- Workers shall not be exposed to high levels of noise or harmful external fumes.

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- If any workers need to remain in areas where the atmosphere may contain toxic substances, or do not have sufficient oxygen levels, or are inflammable, said atmosphere must be controlled and safety measures adopted with this in mind.
- Under no circumstances shall workers be exposed to a high-risk confined atmosphere. It shall be constantly monitored from outside so that, if the case arises, efficient and immediate aid can be provided.

4.6 TEMPERATURE

It must be suitable for the human body during the work time, taking into account the work method and physical load imposed. In any event, a series of preventive measures are described below:

Drinking sufficient fluids and keeping cool while working outside is important.

- Drink water throughout the day, do not wait to be thirsty to have a drink. At least half a liter per hour is recommended. Sports drinks may also be ingested to replace electrolytes lost during dehydration.
- Do not drink fizzy drinks, coffee, tea and alcoholic beverages that dehydrate the body.
- Avoid large meals before working in high temperatures.
- Some medical prescriptions may make workers more susceptible to heat-related illnesses. Consult your doctor or pharmacist to see if you are taking medication that may affect you whilst working in high temperatures.
- Wear lightweight clothing, such as cotton, to help maintain your body cool.
- Wear a hat or sun visor on sunny days to control your body's temperature.
- Plan to perform the majority of the workload during the coolest part of the day. This is usually between 6:00 a.m. and 10:00 a.m.
- Take short breaks in shaded areas to keep cool.
- Do not take salt tablets, unless recommended to do so by your doctor. Many people intake sufficient salt from their diet to balance the salt lost through sweat.

4.7 LIGHTING

- Work sites, premises and construction site roads must have sufficient natural light (if possible) and suitable artificial lighting at night and when natural light is not sufficient.
- Anti-shock laptops shall be used and the color of the light should not change perception of the colors on signs and panels.
- The lighting installations for the premises, paths and work areas must be positioned so that they do not create any hazards for workers. In order to guarantee minimum lighting levels according to the applicable legislation, measurements should be taken in the work areas prior to the commencement of work. The lighting used shall be the same as that indicated in the Appendix “Artificial lighting MED WKI 218”, during the assembly of the wind turbines.

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4.8 FIRST AID

It shall be the employer's responsibility to guarantee first aid can be provided at all times by staff with sufficient training to perform it. Furthermore, measures must be adopted that guarantee evacuation, in order to receive medical care, of workers involved in accidents or affected by a sudden sickness.

4.9 PREGNANT WOMEN AND BREASTFEEDING MOTHERS

Their access to the site must be approved by the Safety Coordinator or the senior manager in charge of occupational hazard prevention in the event that there is no coordinator.

Pregnant women and breastfeeding mothers must have the possibility of resting lying down in suitable conditions.

4.10 DISABLED WORKERS

Work areas must be adapted, taking into account where applicable, disabled workers, if there are any. If so, "how" shall be defined according to applicable legislation.

4.11 MISCELLANEOUS REGULATIONS

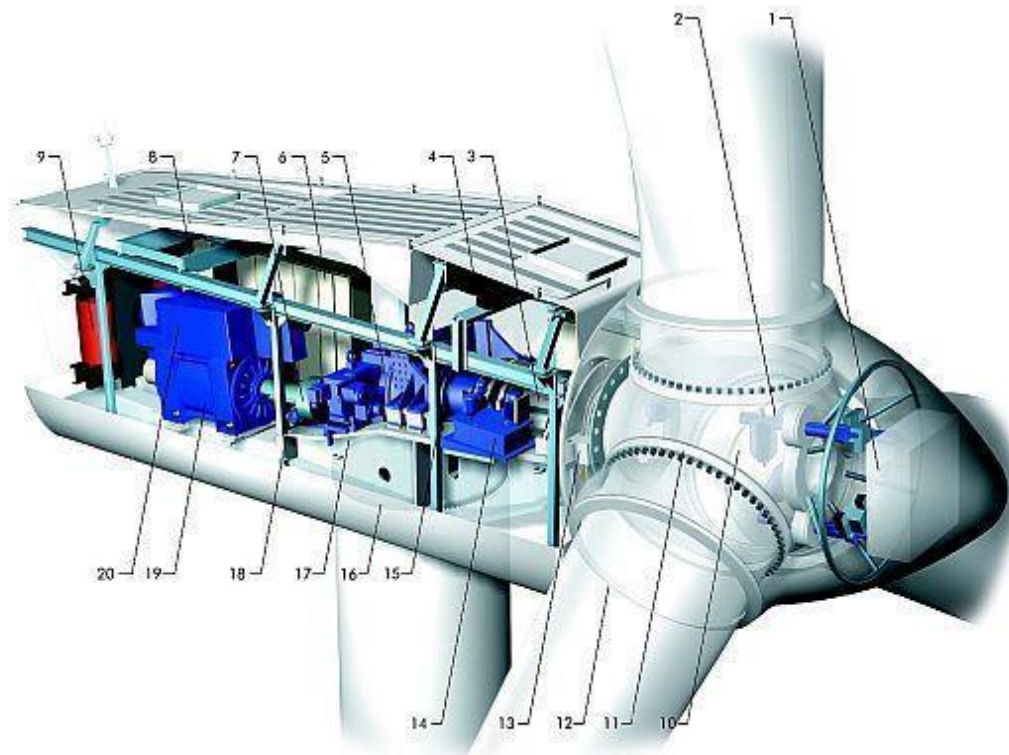
- Site access and the perimeter must be signaled and be clearly visible and identifiable.
- On site, workers shall have access to sufficient quantities of drinking water, and where applicable, other non-alcoholic beverages both in the premises they occupy and near the workstations.
- Workers must have facilities in order to be able to eat, and where applicable, to prepare their meals in safe and healthy conditions.
- There should be no obstacles or hazards for the lowering of the cage underneath the cage's working area.
- Maintain a distance greater than 5 meters from energized electric cables. Do not overload the cage or push it sideways. Even when a door-opening is protected by various cages, each cage (and the crane) must be able to support the weight of the operator(s) working in it, plus the weight of the cable hanging along the entirety door-opening.

HEALTH AND SAFETY PLAN BOP

Mod. II Civil Engineering and Electric Work

WIND FARM ENERGÍA EÓLICA DEL SUR- POLÍGONO
JUCHITÁN

IN JUCHITÁN DE ZARAGOZA, OAXACA, MÉXICO.



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1. DESCRIPTION OF THE WORKS

This section refers to the construction of the wind farm's control room and/or building that houses the electrical substation, as well as the access paths. The tasks considered are described below.

1.1 LEVELING

1.1.1 GENERAL EXECUTION CONDITIONS.

The manner and order of execution and the means used in each case shall be adapted to that set forth in the technical documentation.

- Fixed external reference points shall be arranged around the perimeter of the leveling area to be used for all the readings of elevation lines and horizontal and vertical movements of the points indicated in the technical documentation. The readings shall be noted in an inventory to be monitored by the Construction Management Team.
- The position and the solution to adopt for the installations that may be affected by the leveling, as well as the safe distance to be maintained from aerial electricity lines shall be requested from the distribution companies.
- Rock slabs and constructions that surpass the limits of the leveling area shall not be removed nor have their shorings removed without prior authorization from the Construction Management Team.
- Solutions for natural surface or deep watercourses, a solution to which is not provided in the Technical Documentation, shall be resolved by requesting Additional Documentation.
- The accumulation of superficial water shall be prevented, especially next to sloped edges.
- The wall backfill shall be performed when the wall has the required resistance and in no less than 21 days if it is concrete.
- A new layer shall not be spread after rain until the former one has dried, or it shall be scarified, adding the following drier layer so that the final moisture level is that required.
- In the event of having to dampen a layer, it shall be done without forming pools of water.
- Backfilling work shall be stopped when the ambient temperature in the shade falls below 2° C.
- The passing of vehicles and machinery on compacted layers shall be avoided and in any event, the tires should not pass over the same parts of the surface leaving marks.
- In general, the screed and backfill used for the leveling shall be treated as the top of the slope and the density to be achieved shall not be less than the surrounding ground.

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- Stumps and roots longer than 10 cm shall be removed to a depth no less than 50 cm.
- Work to prevent the erosion of permanent slopes, such as plant coverage, ditches, shall be performed as soon as possible.
- When vibrating rollers are used for compacting, the last few turns shall be applied without vibration.
- The transition between cleared slopes and fill areas shall be made by smoothing the intersection.
- Generally, drainage for backfill areas adjacent to masonry work shall be created before or at the same time as said backfill.
- If an unexpected anomaly is found during digging operations, such as variation in the layers and/or their features, gas fumes, construction debris, archeological remains, etc., the work will be halted at least in that specific area, and the Construction Management Team shall be notified.
- When an urgent problem arises due to unforeseen circumstances, the Constructor shall provisionally take the appropriate measures, based on an assessment thereof, and shall notify the Construction Management Team as soon as possible.

1.2 EXCAVATIONS-REMOVING

1.2.1 General execution conditions and preventive measures

- The manner and order of execution and the resources used in each case shall be adapted to that set forth in the technical documentation.
- Before starting excavations, the surveying performed and the traffic routes that go around the cut shall be approved by the Construction Management Team.
- The position and the solution to adopt for the installations that may be affected by the excavation, as well as the safe distance to be maintained from aerial electricity lines shall be requested from the distribution companies.

1.2.1.1 BEFORE EXCAVATION.

- Barricades shall be placed no less than 1.50 m from the edge of the excavation area; when the barricades make moving difficult, red lights shall be positioned along the enclosure, no more than 10 m apart and at the corners. When there is a sufficient distance between the site fence and the edge of the excavation, it shall be marked with portable barricades or flags at a distance no less than twice the height of the excavation at this edge, unless it is not necessary, having previously built the retaining wall.
- When trees must be felled, the area shall be marked, the trees will be cut at their base, securing them beforehand and subsequently felling them.
- In order to provide the operator with the essential equipment for any situation, the following shall be available on site: a set of levers, wedges, bars, stays, mattocks, planks, flanges, cables with loops or hooks and canvases or plastic sheets, as well as helmets, weatherproof equipment, hard soled boots

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and other resources that may serve for certain eventualities or help the operators that may suffer accidents.

- The machinery to be used shall remain a safe distance from the electricity lines.
- There shall be a differential circuit breaker at the conductors' input connection for temporary electrical installations, pursuant to the Electrotechnical Regulation for Low Voltage.

1.2.1.2 DURING EXCAVATION.

- Before accessing public roads, heavy-duty vehicles shall have a horizontal section of firm earth at least one and a half times the distance between the axles, and at least 6 m long.
- Ramps to move trucks and/or machinery shall conserve the side slope required by the ground with the angle of the slope no greater than that set forth in the technical documentation.
- The ramp's minimum width shall be 5 m, widening at curves and the slopes shall be no greater than 12, depending on whether they are straight or curved sections. In any event, the maneuverability of the vehicles used shall be taken into consideration.
- The working area for each machine in its area shall be marked. Every time a stationary vehicle or machine starts up unexpectedly, it shall trigger an acoustic signal. Whenever in reverse or if the driver lacks visibility, they shall be helped by another operator not in the vehicle. Maximum precautions shall be taken when the vehicle or machinery moves to a different site and/or itineraries overlap.
- When it is essential for a load-bearing vehicle to approach the edge of the excavation area during or after the excavation, safety wedges shall be positioned, and the ground resistance to the weight of the vehicle shall be checked previously.
- When the machine is located above the area to be excavated and at the edges of excavated areas, the vehicle used shall be a rear excavator, provided this is appropriate for the ground, or the improvement work shall be performed by hand.
- The vehicles' and machines' controls and levels shall be checked before work starts and before removing the safety lock.
- Excavated ground, or other materials, shall not be accumulated next to the edge of the excavated area, and should be separated from the edge by a distance no less than twice the depth of the excavated area at this edge unless authorization is provided for each case by the Construction Management Team.
- Dust build-up shall be avoided, but in any event, the operator shall be protected against dusty environments.
- Improvement and clearing of the excavated areas' walls shall be performed for each partial depth no greater than 3 m.

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- In areas and passageways with fall risks greater than 2 m, the operator shall be protected by a safety belt attached to a fixed point or scaffolding or provisional handrails shall be in place. When the movement of operators around the edge of the slope or vertical cut is essential, handrails shall be attached facing the outside of the excavated area and the operators shall move on the wooden boards or equivalent load distribution boards.
- The entire excavated area shall be sufficiently lit while work is performed.
- No work will be carried out simultaneously on the lower side of another work site.
- The cribbing shall be checked on a daily basis before work begins, reinforcing them if necessary. Checks shall also be made for noticeable sinking or cracks in nearby constructions. Maximum precautions shall be taken after work interruptions of more than one day and after changes in the weather, such as rain or freezing.
- When an urgent problem arises due to unforeseen circumstances, the Constructor shall provisionally take the appropriate measures, based on an assessment thereof, and shall notify the Construction Management Team as soon as possible.
- At the end of the day, no excavated walls that appear in the Technical Documentation as requiring cribbing should be uncribbed and the loose blocks that may become detached shall be removed.

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MACHINERY:



Fig. 4: Pala cargadora sobre orugas

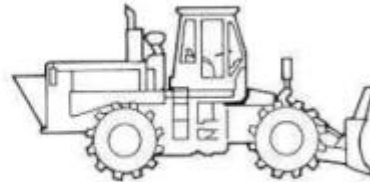


Fig. 5: Compactadora

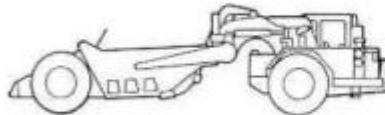


Fig. 6: Mototralla

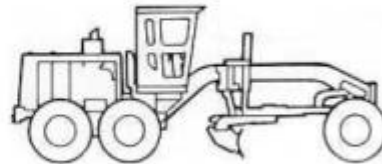


Fig. 7: Motoniveladora

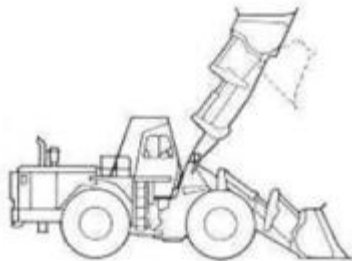


Fig. 1: Pala cargadora de ruedas

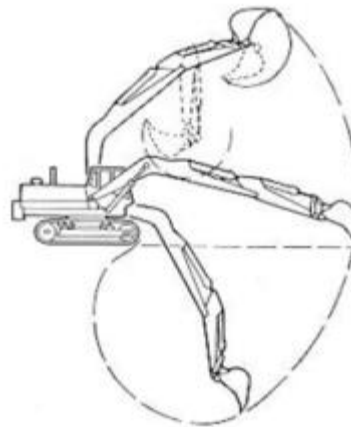


Fig. 3: Retroexcavadora

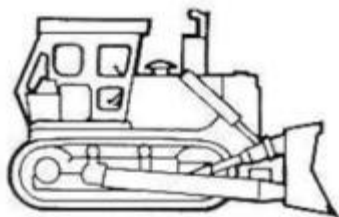


Fig. 2: Bulldozer

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1.2.1.3 AFTER EXCAVATION.

Once the lowest excavated elevation has been reached, a general revision of abutting buildings shall be performed to observe damage that may have been caused and taking the appropriate measures.

While the walls and bottom of the excavated area are being permanently set, the retaining walls, struts and shores, as well as the barricades and/or enclosures used must remain in place to support the nearby constructions and/or ground. The drainage required to prevent the pooling of water that may affect the ground, premises or the foundations of adjacent estates shall remain at the bottom of the excavated area.

1.3 EXCAVATIONS – DITCHES AND PITS

1.3.1 GENERAL EXECUTION CONDITIONS AND PREVENTIVE MEASURES

- The manner and order of execution and the means used in each case shall be adapted to that set forth in the technical documentation.
- Before starting excavations, the surveying performed and the traffic routes that go around the cut shall be approved by the Construction Management Team.
- The position and the solution to adopt for the installations that may be affected by the excavation, as well as the safe distance to be maintained from aerial electricity lines shall be requested from the distribution companies.
- Public Service components that may be affected by the excavation such as hydrants, sewers and manhole covers, street lamps, trees, etc, shall be protected.
- Fixed reference points shall be placed in areas that cannot be affected by the excavation, which shall be used as reference for all the readings of elevation lines and horizontal and/or vertical movements of the points on the ground and/or nearby buildings identified in the Technical Documentation. Daily readings of the movements referring to these points shall be noted in an inventory to be monitored by the Construction Management Team.
- A detailed written record of the control and monitoring measurements taken shall be available on site.
- When the site plan is prepared, the start of the excavation work for the foundations must only be undertaken when all the items required for the construction thereof are available and the last 30 cm shall be excavated at the time the concrete is to be poured.
- The entrance of surface water into the excavated areas shall be prevented, pumping it as soon as possible, and in order to keep the bottom of the excavated area clean, the measures provided in the technical documentation shall be taken and/or Additional Documentation shall be requested from the Construction Management Team.

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Pits next to nearby foundations that are deeper than this one shall be excavated taking the following precautions:

- Reducing, when possible, the pressure of the foundation near the ground by using shoring.
- Performing the excavation and consolidation work in as short a time as possible.
- Leaving, at most, half a side of the foundation block visible but cribbed.
- Separating the consecutive open pits' axes no more than $I1+I2$, where $I1$ and $I2$ is the separation between separate foundation slabs or $I1+I2 \geq 4$ m in strip foundations or slabs.
- Pits that already have a definitive and consolidated retaining structure or have been filled and the ground compacted shall not be considered open pits.

When mechanical excavation equipment is used, such as rear excavators in cribbed ditches, it shall be necessary that:

- The ground can withstand a sloped vertical cut for this depth, checking the technical notes pursuant to applicable legislation. Foundations. Retaining walls. Slopes.
- The separation between the machinery's location and the cribbing is no greater than one and half the depth (P) of the ditch at this point.
- The cribbing is performed from top to bottom via suspended platforms and in the shortest period of time possible.
- Rock slabs and constructions that surpass the edges of the ditch or pit shall not be removed nor have their shorings removed without prior authorization from the Construction Management Team.
- If it is observed that the bottom of the cut rises up when a strip is excavated, work must be halted and the strip must be refilled, as an initial preventive measure. If heaving occurs, gravel and/or loose sand is preferred, and the Construction Management Team must be notified.
- If any unforeseen anomaly is discovered during excavation, such as soft or flooded ground, gas leaks, construction debris or archeological remains, work shall be suspended, at least in this specific area, and the Construction Management Team shall be notified.
- When an urgent problem arises due to unforeseen circumstances, the Constructor shall provisionally take the appropriate measures, based on an assessment thereof, and shall notify the Construction Management Team as soon as possible.
- Once the lowest excavated elevation has been reached, a general revision of the abutting buildings shall be performed to observe damage that may have been caused and taking the appropriate measures.

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- While the walls and bottom of the excavated area are being permanently set, the retaining walls, struts and shores to support the nearby constructions and/or ground, as well as the barricades and/or enclosures used must remain in place.
- The pooling of surface water at the bottom of the excavated area, which may damage the grounds, premises or foundation of adjacent estates, shall be prevented.
- Whenever the passage of pedestrians or vehicles close to the edge of the excavated area is foreseeable, mobile barricades or fences that shall be lit every 10 m with IP-44 protected or greater portable lighting, as per UNE 20.324, shall be used.
- In general, the barricades or fences shall mark no less than 1 m for people passing by foot and 2 m for vehicles.
- When vehicles are operated in the normal direction of the excavated area, the marked zone shall be extended to twice the depth of the excavated area in that direction and no less than 4 m when reduced speed signs are used.
- The storage of materials and earth removed when excavating deeper than 1.30 m shall be positioned more than 2 m from the edge of the cut and away from basements. One operator shall remain outside in order to help and raise the alarm in the event of an emergency, whenever operators are working inside ditches or pits that are deeper than 1.30 m.
- Work shall not be performed simultaneously at different levels of the same vertical side and safety helmets shall always be worn.
- Minimum separation distances between operators shall be marked according to the tools they are using.
- In cuts deeper than 1.30 m, the cribbing must exceed the ground surface level by at least 20 cm and 75 cm on the upper edge of the slopes.
- The cribbings shall be checked on a daily basis at the start of the day, tightening the struts if they have become loose. Likewise, a check shall be performed to ensure any pools of surface water have been removed.
- Maximum precautions shall be taken after work interruptions of more than one day and/or after changes in the weather, such as rain or freezing.
- The cribbing should not be bumped into during excavation work, nor should cribbing frames or elements be used for climbing up or down. Loads such as pipes should not be hung from struts; instead, they must be hung from elements expressly calculated for this purpose, located on surfaces.
- Ditches deeper than 1.30 m shall be equipped with ladders, preferably metallic, that exceed the upper level of the cut by 1 m. There shall be a ladder for every 30 cm of open ditch or fraction thereof, which shall not be blocked and shall be correctly braced crosswise.
- At the end of the day or during long intervals without work, the mouths of the pits deeper than 1.30 m shall be protected with a resistant board, mesh or similar item.

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- In general, the cribbings or part thereof shall be removed only when they are no longer required, and they shall be removed in horizontal sections, starting at the lower part of the excavated area.
- In order to provide the operator with the essential equipment for any situation, a set of levers, wedges, bars, stays, mattocks and planks shall be available, which shall not be used for cribbing but reserved for the rescue team, in addition to other resources that may serve for certain eventualities or help the operators that may suffer accidents.
- Furthermore, all the applicable local provisions shall be complied with.

1.4 TRANSFORMER STATIONS

1.4.1 GENERAL EXECUTION CONDITIONS AND PREVENTIVE MEASURES

- During the installation process, the lines shall be de-energized and grounded.
- A suitable tester shall be used to check the lack of voltage before any work is performed.
- At least two workers must be present in the work area and they must use gloves, insulating mats and other safety materials and tools. Electric tools or equipment used shall be equipped with Grade II insulation, or the power supplied shall be at a voltage lower than 50 V, using a safety transformer.
- For maintenance and revisions, the transformer shall be equipped with the following elements:
 - Switchgear identification plate.
 - Instructions regarding the dangers electric currents involve and the care to be provided to people involved in accidents.
 - Diagram of the transformer.
 - Handling pole.
 - Insulating mat.
- The transformer's identification plates and warning sign shall be positioned at the entrance to the transformer.
- Furthermore, all general provisions applicable based on the area or country where work is being performed shall be complied with.

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1.5 DRINKING WATER SYSTEM

1.5.1 GENERAL EXECUTION CONDITIONS.

- When controlled blasts are performed for the excavation, the necessary precautions shall be taken, pursuant to legislation in force. The appropriate pumping resources shall be available on site.
- When working conduits are expected to be present at the excavation site, their paths must be defined and, if necessary, cutoffs and deviations shall be requested.
- At the start of the day, the cribbings shall be revised to ensure there are no gases or vapors. If present, the ditch shall be ventilated before work is started.
- The material stemming from the excavation shall be stored away from the edge of the ditch. A fence shall be placed along the free rim when the works are performed in inhabited areas.
- Walkways with side fencing shall be placed in the usual pedestrian crossings. The maximum separation between two crossings shall be 50 m.
- If roads with vehicle traffic are crossed, the ditch shall be created in two halves, compacting the first half before excavating the other.
- In all cases, sufficient lighting and signage shall be used, in compliance with the legislation in force regarding minimum light levels. Example: 100 lux work areas, 50 lux crossings, etc.
- Furthermore, all the applicable local provisions shall be complied with.

1.5.2 PREPARATION OF THE SYSTEM FOR SERVICE

1.5.2.1 INTERNAL CLEANING OF THE SYSTEM

Work shall be performed per sector. After isolating one sector by closing the shut-off valves that delimit it, the petcocks shall be opened, allowing water to flow, making it enter the network from each of the connection points in the sector, successively, by opening the corresponding shut-off valve.

1.5.2.2 DISINFECTION OF THE SYSTEM

Work shall be performed per sector. After isolating the sector with the shut-off valves and the petcocks closed, a chlorine solution shall be inserted in a quantity that is sufficient enough to ensure that there is a residual amount of 25 mg/l at the furthest point from the injection point. After 24 hours, the residual amount at said point shall be, at least, 10 mg/l.

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1.5.2.3 EVACUATION OF WASTE WATER AND FINAL CLEANING

Once it has been disinfected, the water contained in each sector shall be evacuated by opening the petcocks and it shall be made to flow again by following the process explained in point 1.

1.5.2.4 EXTERNAL CLEANING OF THE SYSTEM

The collection boxes shall be cleaned and all the parts housed in them shall be painted.

1.6 IRRIGATION SYSTEM

1.6.1 GENERAL EXECUTION CONDITIONS

All general provisions related to the General Ordinance for Occupational Safety and Hygiene shall be complied with.

1.7 DRAINAGE SYSTEMS AND PREVENTIVE MEASURES

1.7.1 GENERAL EXECUTION CONDITIONS

- Whenever pedestrian or vehicle traffic is expected at the site, fences lit with red lights every 15 m shall be placed along the entire ditch on the side opposite that on which the excavation material is stored, or on both sides if such material is removed.
- Furthermore, crossings over the ditches shall be placed at a distance of less than 50 m. Portable lighting shall be made of anti-deflagrating material.
- The appropriate means for pumping shall be available on site in order to quickly clean up any flooding that occurs.
- When working conduits are expected to be present at the excavation site, their paths must be defined and, if necessary, cutoffs of flow and deviations shall be requested. Work must be halted until one of the two alternatives is adopted or the Construction Management Team provides instructions on the working conditions.
- The cribbings shall be checked at the beginning of the day. The absence of gases and vapors in the ditches and pits shall be checked. If gases or vapors are discovered, the ditch or pit shall be ventilated until they are eliminated.
- Furthermore, all the applicable local provisions shall be complied with.

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1.8 STEEL AND PREVENTIVE MEASURES

1.8.1 GENERAL EXECUTION CONDITIONS

- Combustible materials shall be stored away from heat, fire or sparks.
- Electric drills and other electric portable machinery must have double insulation or be grounded: Electrical Installations.
- Earth connection.
- The condition of the connections shall be checked on a daily basis.
- Furthermore, all general provisions related to the General Ordinance for Occupational Safety and Hygiene shall be complied with.

1.8.1.1 ERECTION ON SITE AND CRANE HOISTING.

- Before hoisting the mesh, the condition of the crane cables must be examined and tested in order to verify their characteristics and ensure that it is safe to work with them.
- Special precautions must be taken to avoid any accidents that could occur if the boom or the mesh were to cross the electrical lines near the work site or along the path taken by the former as they are moved.
- Driving or parking is not allowed under suspended or transported mesh, except when it is necessary to implement the work.
- Anchor points shall be left in place in order to tighten the safety belt clamp cables, which must be resistant enough to support the stress levels to which they will be subjected.
- If it is not possible to assemble the mesh on site and hoist it with cranes, instead requiring assembly of the mesh in its last support position, work platforms shall be set up at the appropriate height with handrails at a height of 0.90 m, a middle batten and a 0.20-m skirting board.
- The platform access steps shall be at least 0.50 m wide with 0.90 m handrails.
- Whenever work is done at the edge of the mesh and at a height of more than 6 m a net shall be placed covering the area where work is to be done, around the outer edge, appropriately attached or overlapping to ensure that there are no areas uncovered. It shall not be removed until all the work for which it was required has been completed.
- Work shall be suspended when it rains, snows or the wind speed is higher than 50 km/h; in this last case the tools and materials that may become detached shall be removed.
- Operators charged with assembly shall be equipped with safety gloves and boots and shall use a safety belt when necessary.

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1.9 FORMWORK AND PREVENTIVE MEASURES

1.9.1 GENERAL EXECUTION CONDITIONS

- Each floor's formwork shall be planned, except where directed otherwise by the Construction Management Team, first creating the formwork for vertical elements such as supporting elements and walls.
- Next, the formwork for horizontal or slanted elements, such as beams and slabs, shall be created when the concrete in the vertical elements has aged no less than 3 days and the required bracing elements below them, such as masonry walls or stiffening cores in metal structures, are in place.
- In order for the Construction Management Team to monitor the formwork removal time, the maximum and minimum daily temperatures, and the date on which the concrete was poured for each element, shall be noted on-site as long the formwork and formwork removal tasks are performed.

1.9.1.1 DURING COMPLETION OF FORMWORK

- Newly cut wood that is in contact with the concrete shall be whitewashed or washed with chalk water first, reused wood shall be free of concrete or impurities, have no warps or cracks, meeting the same general conditions as wood received for formwork. When this point is not verified, the number of uses shall be no more than six. In general, joints shall be arranged so as to favor the compression force on the wood.
- The brad quality shall not be lower than that defined in UNE Standard 17033. The brads shall be evenly distributed along the contact surface between the two pieces to be joined, as far apart from each other as possible, separate from the edges and between axes no less than 6 diameters of the brad along the grain of thicker wood and 10 diameters along the grain of thinner wood.
- Double fishplates shall be used whenever possible. Whenever there is room on the surface to be nailed, small diameter brads should be used on hard wood.
- Brads shall be inserted with a slight angle and at differing angles from each other. When they are going to be riveted on the other side, they must be long enough to protrude at least three times their diameter, bending them in the



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direction of the wood grain.

- Joints between planks of linings shall be made, ensuring that the adjacent ones are not joined in the same place.
- Joints on ribs, struts and cross beams shall have double fishplates that are equally squared and the same length on each side of the joint, no less than twice the size of the larger side of the squaring being joined.
- The cribs must be duly watertight, and therefore sawn wood in contact with the concrete must be placed flush.
- The flitches of the walls shall have temporary openings measuring 250 cm², and the vertical and horizontal separation shall be less than 1 and 2 m respectively, to allow for possible cleaning and verifying that the concrete fills the crib.
- There must be at least one opening in the lower part of the support elements. The edges of the linings must be tied to other linings or to auxiliary elements such as collars at the top of the support elements.
- The crib tolerances in on-site layout, dimensions, flatness and plumb lines shall be those defined in the regulations corresponding to the concrete element to be poured. The variation in support elements and beams cannot be more than 5 mm for local movement and must be less than one thousandth of the span for overall movements.
- The crib shall be independent from the expansion joints and other joints in party walls so that the free movement of the concrete element is not hindered as it hardens.
- When there are separators or tie beams between linings or between the lining and a permanent shuttering, care must be taken to ensure that they can be removed, without becoming embedded in the concrete, unless specified otherwise by the Construction Management Team.
- The tie beams shall be placed on the exterior of the lining ribs, embracing them and tightening them until they produce a clean metallic sound.
- Plank scraps shall be placed under the strut wedges when the ground is soft.
- When there are no piles surpassing the height of L, intermediate planes can be created with rigid framework composed of planks placed cross-wise to form a lattice where the pile crosses. The defined plane shall be perpendicular to the piles and shall have at least one edge anchored to the fixed line at a distance from the outer edge that is less than 2 m.
- Before pouring the concrete, the surface of the crib must be checked to ensure it is clean and moist, and that the reinforcing and auxiliary pieces that must be embedded into the concrete, such as hoses and anchoring pins, have been correctly placed.
- The fresh concrete shall be poured into the cribs at the lowest possible height from the bases or the previous layer, avoiding impact and preventing fresh concrete from accumulating at certain points.

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- The speed for pouring fresh concrete shall be no greater than 6 meters per hour on walls.

1.9.1.2 AFTER FORMWORK IS COMPLETED

In general, the formwork flitches should not be removed until at least 7 days have elapsed for support elements and 3 days in other cases, and prior approval must be given by the Construction Management Team.

When removing the formwork on soffits and falsework planes, the time established in the applicable regulations (specifications) shall be taken; the relevant Structural Concrete Structure, after prior approval is given by the Construction Management Team once it has been verified that the time elapsed is not less than that set forth in Table 8 for calculations. The wedges shall be loosened, leaving the bottom 2 or 3 cm from the concrete element, for the next twelve hours, checking whether the deflection produced is within an admissible range for the beam or slab.

- When the lining resists stripping, it must be moistened thoroughly before forcing it, or a surface action form-release agent must be applied that meets the specific conditions established for:
 - Structural Concrete Structures.
 - The wood used shall be clean and free of nails when stored, protected from sunlight and rain and piled in a way that allows for ventilation.
 - The honeycombs or defects found in the concrete when the formwork is removed shall not be filled unless the Construction Management Team issues prior authorization.
 - When the time elapsing between the creation of the formwork and the pouring of the concrete is longer than 3 months, a complete review of the formwork must be performed.
 - Operators shall not be allowed to move between piles once the formwork is finished, in any case, this shall be done near braced piles without bumping into them.
 - Operators and/or hand carts can move about the soffits by distributing the load on planks or equivalent items.
 - Vibrations from motors must not be transferred to the formwork.
 - Operators working at heights of over 3 m must be protected from possible falls by using a protective net and/or safety belt attached to a fixed point.
- During periods of strong winds, at a minimum, the formwork for vertical concrete elements with a slenderness greater than 10 shall be hauled taut with cables or ropes.

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- In periods of heavy rain, the soffits of beams and slabs shall be covered with waterproof or plastic canvas.
- Work shall not be done on formwork subjected to winds stronger than 50 km/h or in the proximity of high voltage electrical lines or in the same vertical line as other unprotected operators.
- Flammable substances must not be stockpiled near wood formwork, and at least one handheld fire extinguisher must be available at the work site.
- Furthermore, all the applicable local provisions shall be complied with.

1.10 METAL BEAMS (FALSEWORK) AND PREVENTIVE MEASURES.

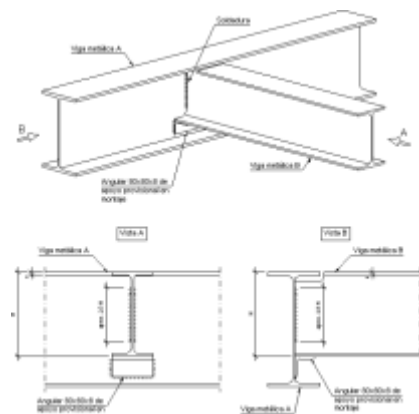
1.10.1 GENERAL EXECUTION CONDITIONS

1.10.1.1 PRIOR TO ASSEMBLY:

The beams shall arrive from the factory with finished caps, so that during assembly only the essential welding is done.

Two suspension points shall be used to hoist the beams, with such elements maintaining a stable balance.

The pieces that are to be welded together must be attached to each other or to reinforcing molds to ensure that they are immobilized during the welding work. When attaching the pieces to each other, sleeves made of L-profiles or welded points can be used. Both can remain as part of the structure.



1.10.1.2 DURING ASSEMBLY.

Electrodes that meet the following quality conditions shall be used:

- Tensile strength of deposited material > 42 kg/mm².
- Ultimate elongation >22%. Resilience >5 kg m/cm².

Welding work must be sheltered from wind and rain. Welding work shall be suspended when the temperature drops below 0°C.

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1.10.1.3 AFTER ASSEMBLY.

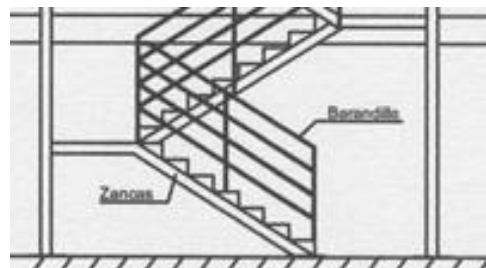
- After inspection and acceptance of the assembled structure, the areas where welding was done on-site shall be cleaned and a layer of primer applied. After the primer dries, the entire structure shall be painted according to the Regulations for "Surface Coverings. Paint".
- The apparent conditions of all the lifting equipment shall be checked daily, and every three months a complete review of them shall be conducted. People must avoid remaining under suspended loads and under flying sparks, and spraying welding beads should be prevented.
- When sufficient protection is not available to conduct the welding, a safety belt shall be used; fixed hook points shall be planned for on the structure for this purpose. Furthermore, all the applicable local provisions shall be complied with.

1.11 STRINGERS AND PREVENTATIVE MEASURES.

1.11.1 GENERAL EXECUTION CONDITIONS

1.11.1.1 PRIOR TO ASSEMBLY.

- Stringers shall be received from the factory with finished ends, ready so that during assembly only the essential welding is done. Two suspension points shall be used to hoist the stringers, with such elements maintaining a stable balance.
- The pieces that are to be welded together must be attached to each other or to reinforcing molds to ensure that they are immobilized during the welding work. When attaching the pieces to each other, sleeves made of L-profiles or welded points can be used. Both solutions can remain as part of the structure.
- All the falsework, centering and other provisional support elements needed shall be provided. Before starting assembly, any dents, buckling or twisting that may have been caused during the transport operations shall be corrected.



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1.11.1.2 DURING ASSEMBLY.

The necessary precautions shall be taken to shelter welding work from wind and rain. This work shall also be protected from the cold, generally suspending the work when the temperature drops below 0°C.

Electrodes that meet the following quality conditions shall be used:

- Tensile strength of deposited material > 42 kg/mm².
- Ultimate elongation >22%.
- Resistance 5 kgm/cm².

1.11.1.3 AFTER ASSEMBLY.

After inspection and acceptance of the assembled ladder structure, the areas where welding was done on-site shall be cleaned and a layer of primer applied. After the primer dries, the entire structure shall be painted according to the Regulations for "Surface Coverings. Paint".

The operators in charge of assembly or handling of reinforcements shall be equipped with safety gloves and boots, aprons, belts and tool bags.

Operators who handle concrete shall wear gloves and boots that prevent contact between their skin and the concrete.

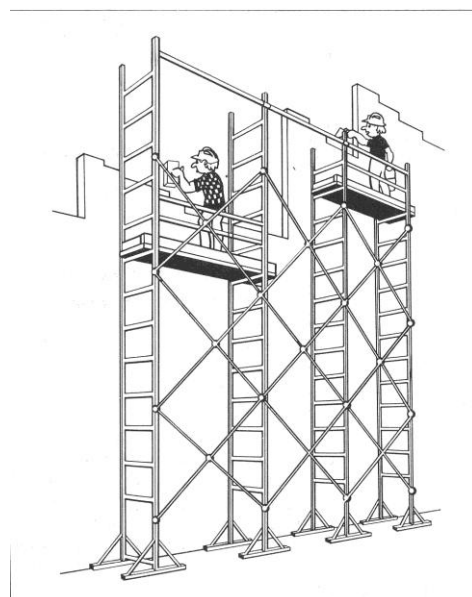
1.12 VIBRATED CONCRETE BLOCKS AND WALLS; PREVENTIVE MEASURES.

1.12.1 GENERAL EXECUTION CONDITIONS

Whenever work must be done on superimposing levels, the workers on the lower levels must be equipped with nets, visors or equivalent protective measures.

The scaffolding must be arranged so that the operators never have to work above shoulder level. The following preventive specifications must be taken into account during assembly of tubular metal scaffolding:

- The initial level must be complete with all the stability features before assembly of the next level can be started.



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- There must be a sufficient degree of safety on the initial stabilized level so as to provide the required guarantees in order to latch the safety belt catch to it.
- The bars, tubular modules and planks shall be hoisted with standardized slings.
- Work platforms shall be stabilized immediately after being built by using locking clamps to prevent tilting.
- The claw bolts shall be equally tightened, and the section assembled shall be inspected before starting the next one, in order to prevent hazards caused by loose or missing bolts.
- The joints between tubes shall consist of "knots" or metal "bases", or made of claws and pins, depending on the available models.
- Work platforms must have a width of at least 60 cm.
- The work platforms shall be edged with a 15-cm skirting board.
- There shall be a solid railing mounted on the vertical plane of the back skirting board at a height of 90 cm, consisting of a handrail, middle batten and skirting board.
- The work platforms shall be held in place with clamps and pins nailed to the planks.
- The base modules of tubular scaffoldings shall rest on load distribution boards in the areas that rest directly on the ground.
- The base modules specially designed for pedestrian crossings shall additionally have "ceiling height" boards and visors to prevent impacts on third parties.
- Tubular scaffolding base modules shall be braced with level tubular cross-bars at a height of more than 1.90 m, and with dividers to make the entire set-up rigid and ensure its safety.
- Prefabricated stairs shall be used to vertically connect the levels of the tubular scaffolding (an auxiliary component of the scaffolding itself).
- Resting tubular scaffoldings on additional elements made of drums, piles of various materials, "turrets of several types of wood" and similar items is prohibited.
- The support platforms for worms (leveling screws) on the base of tubular scaffoldings placed on distribution boards shall be nailed to the boards with steel nails driven completely in without bending.
- Work on platforms located on top of tubular scaffoldings is not allowed unless they are first protected with solid railings placed at a height of 90 cm. composed of handrails, middle battens and skirting boards.
- On tubular scaffoldings on modules with side ladders, the ladder shall be mounted on the outer face, that is, facing the side where work is not to be done.
- The use of trestles resting on work platforms on tubular scaffoldings is prohibited.
- Tubular scaffoldings shall be assembled at a distance equal to or less than 20 cm from the vertical face on which work is being done.
- Tubular scaffoldings must be braced to the vertical faces.

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- Making "paste" products directly on the work platforms is prohibited, in order to prevent there being slippery surfaces that might lead workers to fall.
- Materials shall be evenly distributed over the work platforms to prevent accidents due to unnecessary overloading.
- Materials shall be distributed evenly on a board located mid-way along the back part of the work platform, such that its existence does not decrease the net surface area of the platform.
- Work on platforms located at lower elevations than other platforms on which work is being done is prohibited, in order to prevent accidents from falling objects.
- Work on tubular scaffoldings is prohibited when there are strong winds in order to prevent falling.

All applicable general provisions in the General Ordinance for Occupational Safety and Hygiene shall be complied with.

1.13 MASON WORK AND PREVENTATIVE MEASURES.

1.13.1 GENERAL EXECUTION CONDITIONS; PREVENTATIVE MEASURES

When the reinforced concrete structure is complete and the auxiliary elements have been removed, such as machinery and materials and protective nets, the site shall be completely clean and orderly in appearance.

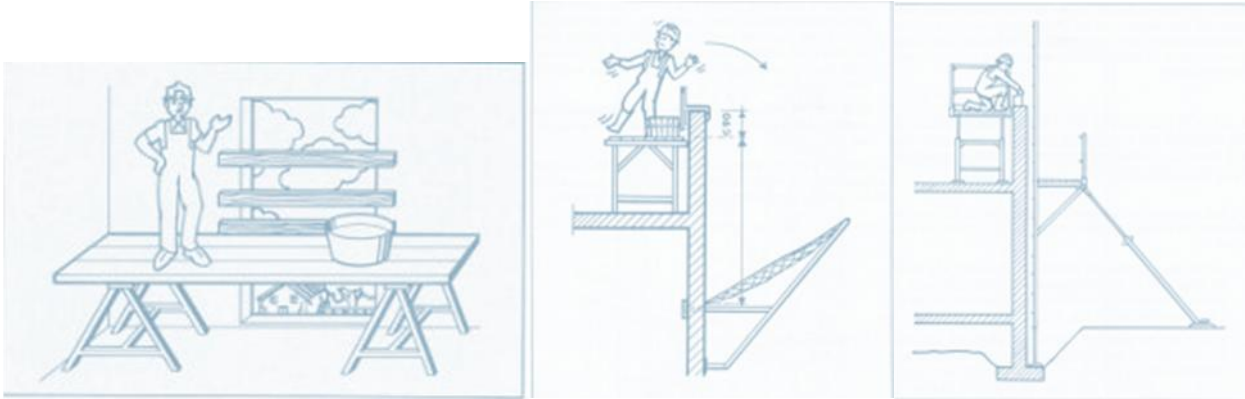
All the fall risk points shall be protected by defense elements and mason work operations can begin. Since this stage of work involves combining the maximum number of activities on the work site, the following guidelines must be set forth:

- When there are strong winds or gusts, operators must not stand next to newly built partition walls.
- If the work requires the use of steel tips, safety goggles must be worn.
- An Order and Cleanliness Plan must be implemented, and materials shall be stored in the established areas, tools and instruments organized and debris cleaned daily. This debris shall be removed by using dumping chutes that empty into properly indicated containers or enclosures.
- The preventive measures for ladders, tubular scaffolding or trestles shall be taken into account.
- The preventive measures required to prevent overexertion shall be taken into account (manual handling of loads).
- When tasks are performed in which fragments may fly or particles become detached, certified personal protective eye equipment must be used. Therefore, when tasks are performed involving flying solid or liquid particles that do not have an aggressive impact, safety goggles with frames allowing for panoramic vision must be used.

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- Physical measures shall be taken to protect existing holes in order to prevent falls from a different level by the staff working in the vicinity.



- Temporary steps shall be placed on stairway ramps to allow for safe transit of workers.
- During surveying operations, safety belts attached to a temporary lifeline tied to pillars shall be used, and this must be duly indicated with signs.
- Pallets of bricks shall be stored next to pillars to avoid overloads on the structure in places with less resistance.
- When performing work near newly erected partition walls whose stability is uncertain, such walls shall be shored. Otherwise, work in the vicinity must be avoided, especially when there is strong wind.
- Pallets shall be transported appropriately, perfectly palletized, to avoid any items becoming detached.
- Preferably, properly set up loading docks with lifelines where a safety belt can be attached shall be used in operations requiring aid in unloading the pallet with the tower crane.
- The hand tools and instruments used shall be tidied appropriately, any that are in poor condition shall be replaced and they shall be used for their intended purpose.
- If work is done close to aerial power lines, the required safe distance shall be kept or appropriate insulated screens shall be used to avoid electric contact.
- When performing any work in the presence of cement, certified protective gloves shall be used to prevent the risk of dermatitis.
- The electric installation must be equipped with differential protection with a sensitivity level of 300 mA.
- Electrical conductors shall have a nominal voltage of 1,000 V if they run outside.
- The electric switchgear included under cabinets or casings shall have the protection level required based on the location needs.
- Receptors shall have standard sockets (not connected with bare cables). Electrical conductors shall be insulated with an appropriate coating whose properties do not change over time and which limits the contact current to a value of no more than 1 milliampere. Paint, varnish, lacquer and similar products shall not be considered satisfactory insulation for these purposes.

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- If portable lighting is available, watertight lamp holders with insulated handles and protective bulb grilles shall be used, with 24-volt power or protected against water jets.

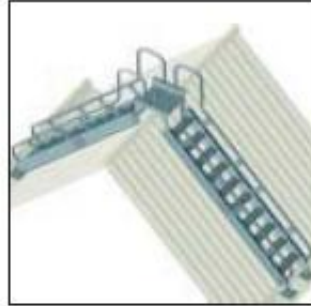
Applicable to partition walls

- The lack of order and cleanliness in this activity can be considered one of the most frequent causes of accidents.
- Before starting on-site layout work of partition walls, the work sites must be cleaned and any protection elements checked and replaced on openings and façades.
- While the partition wall is being built, the work sites must be cleaned and any protection elements checked and replaced on openings and façades.
- While the partition wall is being built, only the protection elements that hinder performance of the work shall be removed, and the work sites shall be left in perfectly safe conditions when work is finished.
- Materials shall be stockpiled in an orderly fashion and the load capacity of the slab they are resting on must be kept in mind.

1.13.2 Roofs; Preventive Measures

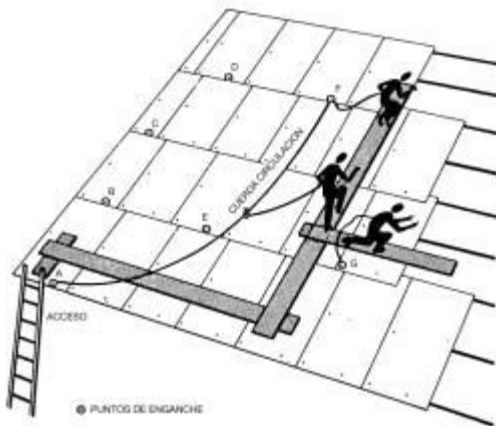
- Covering the entire perimeter of the roof with scaffolding, walkways or nets on poles constitutes an appropriate measure against falls from the roof.
- Likewise, on perimeters or openings where it is possible to do so, railings that are 90 cm in height, with middle batten and skirting board, shall be installed.
- In places where it is impossible to place collective protection systems for the risk of falling from heights, lifelines shall be installed, where a safety harness can be attached.
- It is advisable to provide access to the roof through openings in the roof plane or by perimeter safety scaffolding, when it exists.
- For transit around the roof area, one must never step directly on trusses or purlins, or on the mounted plate, but rather, on “roof ladders” or walkways measuring at least 0.60 m. wide, which shall be equipped with strips serving as spokes, resting on resistant elements of the roof so that any tilting effect is eliminated and they are held in place so that they cannot slip.

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Pasarelas portátiles

- It must be possible to move them at will as the job progresses without requiring the workers to stand directly on the roof.
- Walkways must be used jointly with the safety harness and fall arrester as the transit panel alone is not safe enough.



- When materials are stockpiled on slanted planes, wedges shall be used to reduce the slope in an effort to distribute the loads as evenly as possible in order to avoid unnecessary overloads.
- Materials shall be hoisted onto the roof in trays, in which the material to be lifted must be arranged so that it is perfectly immobilized.
- The roof pitches must remain free of objects that hinder movements.
- Hanging loads should not pass over people or vehicles, which can be avoided by properly training the crane operator and by using safety devices (end stops) if necessary.
- The workers shall be trained and informed about the proper use of tools, in order to prevent blows, cuts and even overexertion.

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- In order to prevent electric shock, differentials with an earth connection shall be installed, the receptors shall be connected with the appropriate standard plugs and hand tools with double insulation shall be used.
- Safety signage shall be placed at the site. These signs shall be perfectly visible and leave no doubt as to how to interpret them.

1.13.3 WATERPROOFING WORK WITH ASPHALT MATERIALS

A) Most Common Risks

- Use of propane or butane tanks on jobs requiring heating of asphalt products.
- Auto-ignition of these products, with a risk of burns, fires and explosions.
- Operators falling from heights.
 - Falling materials, tanks, etc.
 - Spilled hot asphalt products, in cases in which hot asphalt bitumen is applied, overturned pots, etc.
 - Exposure to aromatic hydrocarbons present in tar and coal pitch.
 - Explosions due to accumulated gas from leaks on inappropriate premises or poor storage thereof.
 - Skin disorders due to contact with asphalt products.

B) Required personal protective equipment

- Polyethylene helmet (preferably with chin straps)
- Safety footwear.
- Wellington boots.
- Gloves.
- Appropriate work clothes (fitted and non-flammable).
- Waterproof apparel.
- Face respirator.
- Safety harness.

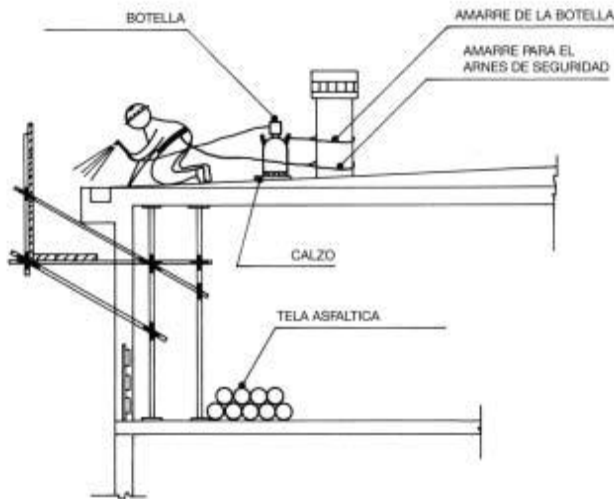
C) Preventive Measures

- All the measures included for work on roofs.
- Propane tanks shall be stored in ventilated places with ground level floors, in the exterior they must be in the shade and never next to wells or areas where gas may be stored in the event of a leak, since gas is heavier than the air.

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- The tanks must be kept away from evacuation routes.
- The tanks must be equipped with pressure-reduction valves.
- The reservoir's hose must be strengthened and in perfect condition.
- The out-of-order tanks' valves must be kept closed.
- Hoisting the tanks with cranes must be performed using platforms or equipment that prevent knocks or falls.
- The pressure reduction valves must not be disassembled or turned off.
- The tank must be kept vertical and secure in the work area.
- The cylinder drain hose must be perfectly connected to the pressure reduction valve and the oil reservoir with well-tightened clamps of the same diameter.
- The on-site melted bitumen boilers for hot seals must be perfectly stable.
- They must be permanently monitored to ensure that the temperature of the melted bitumen does not pass 240° C.
- The product shall be prevented from overflowing by maintaining it 10 cm. below the rim.
- The bitumen boilers must be kept at the following distances:
 - 1 m. from the site's flammable elements.
 - 6 m. from propane tanks.
 - 10 m. from the propane tank storage facility.
 - 3 m. from other boilers.
 - 6 m. from evacuation routes.
 - 10 m. material and flammable liquid warehouses.
- While work is performed, a 6 kg powder fire extinguisher must be within reach.
- Avoid skin coming into contact with bituminous products.
- Do not clean skin with unsuitable products such as gasoline, benzene, trichloroethylene, etc.
- Do not eat, drink or smoke in these work areas

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1.13.2 AUXILIARY ITEMS

When performing tasks in the open or in unprotected areas, metal props with protective railings must be installed.

At least one third of the planks that compose the scaffolding floor must be attached to the trestles.

If metal trestles with connecting chains are used, the chains must always remain taut.

1.14 ROUGH RENDERING AND MORTAR FINISHING COATS

1.14.1 GENERAL EXECUTION CONDITIONS; PREVENTIVE MEASURES

- At the beginning of the working day, all the scaffolding and auxiliary resources shall be checked, verifying the protection elements and stability of the assembly.
- When the platforms are mobile, safety locks must be used to prevent them from sliding.
- The lower level shall be marked off, where the rendering is to be applied. No other work shall be done on the upper part.
- Tidiness and cleanliness in the work areas.
- When work is being done from interior scaffolding or using plank walkways in premises that have openings or windows looking onto the exterior, they shall be protected with railings or nets.
- Appropriate lighting at the work sites.
- Portable lamps shall have protection wire, which shall be grounded in the relevant standardized panel.
- Furthermore, all the applicable local provisions shall be complied with.

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1.15 TILING

1.15.1 GENERAL EXECUTION CONDITIONS; PREVENTIVE MEASURES

- When work is done on scaffolding (wheeled, etc...), an effort must always be made to work on surfaces measuring no less than 60 cm wide (the smaller side).
- When work is done on surfaces that are raised above the floor level near vertical openings (windows, balconies, etc.), these openings must be covered with plants, nets, props, railings, etc., at a suitable height, in order to prevent the risk of falling from heights.
- Transit areas must remain free of materials or debris thereof at all times, and any zones that are blocked off must be signaled and alternative paths used.
- Step ladders must be used for these jobs in interiors, and shall be equipped with stays at the top, a stopper chain and anti-slip feet.
- Portable lighting for interiors shall be equipped with double insulation and protective bulb grilles, protected against water jets and shall use 24 V power.
- Ceramic pieces and sheets of marble, etc., shall be cut with a wet saw to prevent excessive dust from forming in the air.
- The materials shall be perfectly piled and tied when hoisting them up to the relevant floors on perfectly tied wood platforms.
- Connecting electric cables with stripped ends to electric power supply panels is not allowed. Instead, standard plugs shall be used.
- Hand carts shall be used to transport materials (plates, sacks, etc...) in order to avoid unnecessary strain.
- To reduce the risk of indirect electric contact, differentials that work with an earth connection shall be in place.
- Workers must be trained in the correct use of their hand tools to prevent misuse thereof that could lead to blows or cuts.
- Floors in areas with pedestrian traffic shall be signaled with flags or by similar means.

1.16 FLAT GLASS

1.16.1 GENERAL EXECUTION CONDITIONS; PREVENTATIVE MEASURES.

Glass shall be stored in a tidy fashion at the work site in a vertical position in duly protected places, away from any other type of material. Once in place, they shall be signaled so that the entire surface is clearly visible.

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- Glass must always be kept in a vertical position when handled, wearing mechanical protection gloves or mittens that cover up to the wrists and, in the case of large sized glass, with the aid of suction cups.
- Whenever possible, glass panes must be positioned from the interior of the buildings. When this must be done from the exterior, a work platform shall be available that is protected by a 90-cm high railing and a skirting board measuring 20 cm.
- Auxiliary means shall be used to ensure the stability of the glass until it is permanently in place. Glass fragments coming from trimming or breakage shall be cleaned up as soon as possible and placed in the containers for this purpose. They shall be taken to a dump, restricting handling thereof to a minimum.
- Work shall be stopped if the temperature drops below 0°C or if the wind speed is greater than 50 km/h.
- Furthermore, all the applicable local provisions shall be complied with.
- Pieces of glass shall be stockpiled in the areas defined for such purpose. These pieces shall be stockpiled on wood sleepers.
- Individuals shall not be allowed to remain underneath areas in which glass work is being done, and therefore it is necessary to mark off this area with flags or plastic tape (black/yellow).
- Signaling glass that is in place is also recommended, by painting on it or using stickers, etc.
- Careful cleaning and order is especially important in this type of tasks in places in which traffic or material transport is expected.
- The workers shall be trained and informed about the proper use of tools, in order to prevent blows, cuts and even overexertion.

1.17 INTERIOR AND EXTERIOR WOODWORK

1.17.1 GENERAL EXECUTION CONDITIONS; PREVENTIVE MEASURES.

Applicable to ironwork

- With regard to personal protective equipment to be used based on the type of work to be performed, workers must use equipment that protects their hands and feet. To protect hands, certified safety gloves must be used that protect against mechanical hazards. Certified professional protective footwear must be used to protect feet.
- When tasks are performed in which fragments may fly or particles become detached, certified personal protective eye equipment must be used.

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- The electric installation must be equipped with differential circuit breakers at the hub with a sensitivity level of 300 mA.
- The specifications to be complied with, depending on the type of electric tool used, must comply with that set forth in the Electrotechnical Regulation for Low Voltage.
- In order to prevent any type of hazard caused by a lack of or deficient lighting that may exist in the workplace, the light spots must be complemented by portable lighting, if necessary.
- Measure existing sound levels in workplaces.
- Soldering and flame cutting work is prohibited in areas where flammable paints are used, in order to prevent explosions (or fires).
- Woodwork items must be handled mechanically whenever possible. These items must be joined and guided using slings.
- To insert the necessary sections, protection must only be removed from the indispensable elements and must be replaced immediately.
- Machinery must be checked before use, checking their protective equipment is in a good state of repair.
- A safety belt must be work when elements need to be installed on the outside of the façades.

Applicable to woodwork

- With regard to personal protective equipment to be used based on the type of work to be performed, workers must use equipment that protects their hands and feet. To protect hands, certified safety gloves must be used that protect against mechanical hazards. Certified professional protective footwear must be used to protect feet.
- When tasks are performed in which fragments may fly or particles become detached, certified personal protective eye equipment must be used. Safety goggles must be worn to protect against mechanical impacts.
- In order to prevent any type of hazard caused by a lack of or deficient lighting that may exist in the workplace, the light spots must be complemented by portable lighting, if necessary.
- Measure existing sound levels in workplaces.
- In order to avoid, or at least reduce, injuries caused by using cutting equipment, hands must be protected by mechanical protection gloves, and the body protected by mechanical protection gloves.
- The following preventive measures regarding the use of tools must be adopted:
 - Only use tools for the work for which they are intended.
 - Appropriate selection of the size and type of tool to be used.
 - Do not use tools with defects that limit safety.
 - Keep them clean and grease-free and in proper working order.

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- Electric tools must be disconnected from the power source before changing any accessory, replacing and adjusting the safety devices before using the tool again. They must be placed in a location where there is no chance of them falling when pulling the cable or hose.
- To ensure safe handling, workers must be trained.
- Regular checks and maintenance of the tools.
- Collective protective equipment, such as barriers or screens that as well as prevent trappings as well as fragments or particles flying towards the worker must be considered.
- Sanding work using a handheld electric sander must be performed in a ventilated area, to avoid dusty atmospheres or excessive dust.
- To insert the necessary elements, protection must only be removed from the indispensable elements and must be replaced immediately.
- Machinery must be checked before use, checking their protective equipment is in a good state of repair.
- Offcuts and sawdust must be removed from the site in the same way as waste.
- To prevent knocks and falls, doors and windows must be put in place by two operators.
- Wooden sheets and planks must be transported with the front end elevated.
- Ladders with non-slip feet must be used.
- Varnishes and glues must be stored in ventilated areas, and smoking will not be permitted, being appropriately signed.

1.18 PLUMBING

1.18.1 GENERAL EXECUTION CONDITIONS; PREVENTIVE MEASURES.

- Prior to the installation of sanitary fixtures and plumbing in general, which shall be performed when the work is in an advanced state, there are other types of operations that must be performed during the masonry work, such as the pipes, roof finishes and openings, etc.
- To install the pipes, that set forth for the chasing and installation of PVC described in the electricity article must be taken into consideration since the hazards and protective equipment to be used are similar.
- The material and pertinent tools must be stored in an area on the ground floor intended for said purpose in which the specific work can be carried out: chasing, soldering, etc. Special care must be taken to not store solvents, adhesives and PVC materials in areas where high temperatures are possible. An extinguisher must be installed. If holes are to be made in the top slab, special care must be take to not damage joists or beams.

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- When cracking blocks is required, a worker will be located on the floor below to prevent material falling on people located on said floor.
- Light spots must be used in those areas that lack optimal natural light. These spots and connecting elements must follow the standards indicated in the applicable Lighting Instruction.
- Special care must be taken when soldering galvanized and lead pipes, since the vapors emitted carry significant hygienic hazards. Approved facemasks equipped with gas and dust filters must be used.

1.19 PAINTING

1.19.1 OVERVIEW AND PREVENTIVE MEASURES.

- To analyze the work in this chapter, we must only take into consideration the partial work phases that are to be carried out by those responsible for the task, since hygienic assessment of the elements that form the raw material and the solvents used must be known by the worker. In any case we must have the MSDSs for each product.
- Likewise, when priming with anticorrosion materials made in the workshop with zinc chromate, lead chromate, lead oxide, etc., using a spray gun, individual protective clothing must be worn that prevent these products from being inhaled and ingested.

1.19.2 GENERAL EXECUTION CONDITIONS; PREVENTIVE MEASURES.

- At the beginning of the working day, all the scaffolding and auxiliary resources shall be checked, including the railings, baseboards and other protective elements, as well as the assembly's stability.
- When the platforms are mobile, safety locks must be used to prevent them from moving.
- The lower level shall be marked off, where the paint is to be applied.
- Contact between skin and paint must be avoided as much as possible, therefore workers performing painting must be provided appropriate clothing that protects them from with splashes and enables them to be mobile.
- The pouring of paints and solid raw materials such as pigments, cement, etc. must not be performed excessive heights so as to avoid splashes and clouds of dust.
- When working with paints that contain organic solvents or toxic pigments, smoking or eating is not permitted.
- When applying primers that give off organic vapors, workers must be provided with a face mask, equipped with the relevant chemical filter, or mechanic filter when using a high-pigment-content paint and without organic solvents that prevent solid particles being ingested.

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- When applying paints that represent fire hazards, they must be removed from all heat sources, such as soldering work, etc. and an extinguisher must be at hand in the area.
- Storage of paints likely to emit flammable vapors must be performed in sealed containers, away from heat sources and in particular, when storing containers holding nitrocellulose, they must be turned over regularly to avoid fire risks. The premise must be equipped with suitable fire extinguishers.
- Furthermore, all the applicable local provisions shall be complied with.

1.19.3 AUXILIARY ITEMS

When performing tasks in the open or in unprotected areas, metal props with protective railings must be installed. At least one third of the planks that compose the scaffolding floor must be attached to the trestles.

If metal trestles with connecting chains are used, the chains must always remain taut.

1.19.4 GENERAL RECOMMENDATIONS:

- Provide suitable ventilation.
- Avoid direct contact with liquid paint and solvents.
- Protect eyes and uncovered parts of the body.
- Use appropriate work clothing (e.g.: leather apron).
- Keep strict personal hygiene.

1.19.5 WORK PHASES TO BE STUDIED:

- Priming jambs on site.
- Painting ceilings.
- Painting on interior vertical faces.
- Painting on exterior vertical faces.
- Painting on interior woodwork.
- Painting on roof.

1.19.5.1 PRIMING OF JAMBS ON SITE

- Given that this task takes place at the same site and coincides with the beginning of the masonry work, it is evident that the workers that move around the site to perform this work are exposed to risks when moving around the site.

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- It is important to differentiate the general risks that depend on the state of the site: closing of holes, internal protection, etc., and that depend on the contractor or company carrying out the concrete or masonry work and the risks stemming from companies performing other work, falling materials, cleaning of the site, etc.
- Therefore, the use of safety footwear with anti-nail protection and safety helmets is considered essential.

1.19.5.2 PAINTING ON CEILINGS

- A type of work that presents little risk except when caustic materials that may splash in the eyes are used; in this case, wearing safety goggles to protect against splashes is necessary.
- Depending on the location of the work area, using trestle scaffolding or a stepladder is necessary.
- If using trestle scaffolding: the heels forming the scaffolding will be secured to the trestles and must not overhang by more than 20 cm, the minimum width of the platform must be 60 cm.
- If using stepladders: they must be equipped with braces, will be fitted with non-slip feet and must be at least 0.50 meters wide.
- The scaffolding or work platform's mobility will depend on the surface it rests on, avoiding stretching, adopting unbalanced positions, which may cause staff or the platform to fall, at all times.

1.19.5.3 PAINTING ON INTERIOR VERTICAL FACES

For this type of work, and given that generally trestles or stepladders are used, the instructions are the same as the previous point.

1.19.5.4 PAINTING ON ROOF

Must be performed using a safety belt fastened with safety cables or eyebolts, attached to solid, resistant elements, since it is a job that involves the hazard of falling from heights.

1.20 ELECTRICITY

1.20.1 GENERAL EXECUTION CONDITIONS AND PREVENTIVE MEASURES.

Based on the various risks it involves, the following work sections are considered for this section:

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- Installation of the electric panel.
- Positioning of the closed conducting ring for grounding system.
- Auxiliary installations on site.
- Final installation.
- Finishing.

1.20.1.1 INSTALLATION OF THE ELECTRIC PANEL

- Includes the installation, at the start of the work, of the electric panel, which features, the main isolating switch, and individual differential circuit breakers for each machine to be used and for the lighting. Likewise, a cabinet must be used to directly connect the machines, so as to not require terminals. A protection conductor will connect the Ground terminal to a rod with each grounding point. The panel, installation and materials must comply with regulations.
- The general electric panel shall be located within a hut equipped with padlock and lock.
- The risks faced by the person installing the panel are those stemming from direct or indirect contact with the electrical current, since it is the beginning of the work.

1.20.1.2 POSITIONING OF THE GROUNDING SYSTEM

The basic risks during this work phase are:

- Handling of the wire.
- Soldering the wire.
- Moving in ditches.
- Heavy machinery.

Since the area will be shared with the structure company during the start-up phase, wearing protective clothing will be necessary to nullify the hazards involved.

1.20.1.3 AUXILIARY INSTALLATIONS ON SITE

These installations shall be performed based on the site's needs, since there is no set method to follow. However, these are tasks with significant risks since there are various trades in the area at the same time.

The following tasks are considered:

- Connection of the crane jib, service lift, portable machinery etc. to the grid.

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- Provisional lighting installation.
- Installation of auxiliary panels, etc.

The following general standards, as well as the legal requirements must be taken into consideration:

- Install the site's electrical conductors in the air and not laid in the ground.
- Protect the connections with the corresponding plugs and sockets.
- Install the site's lighting appropriately, paying special attention in those zones that present hazards due to their location or traffic.

The risks stemming from this work phase are those corresponding to the work phases studied in the structure, masonry work, etc. chapters.

1.20.1.4 CREATION OF CHASING FOR INSTALLATION OF PVC PIPES

- Opening chases is one of the most dangerous operations, since the machine used to do so involves the risk of flying fragments, and for this reason the use of safety goggles is essential and it is also necessary to keep one's free hand protected.
- In order to create the chases and insert the plastoflex tubes in areas that are higher than 1.70 meters, trestle scaffolding or work platforms shall be used to prevent the operator from falling when exerting pressure on the vertical face.
- If work is done on balconies or in stairwells when the carpentry has not been installed defense elements shall be installed to prevent falling to another level.

1.20.1.5 FINAL INSTALLATION

- During this general work phase, the openings that present different-level falls must be covered. The site will be at its maximum trade activity, therefore no spliced cables must be connected to the grid and there must be no unprotected connections.
- To gain access to the inspection hatches and the highest light spots, ladders or trestle scaffolding must be used as per the regulations for use.
- The tools will be in good condition, with the relevant isolation and naked cables must not be handled when energized. Points to take into account and that may present greater risk of falls, the highest points in the stairwells and balconies. Maximizing precautions and adopting group protective equipment is extremely important, in order to prevent falls from different levels.

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- In those areas that stand out due to hazards stemming from machinery, work must be carried out by disconnecting the machinery and engines until the installation is complete.

1.21 ANTENNAS

1.21.1 GENERAL EXECUTION CONDITIONS AND PREVENTIVE MEASURES.

- When installing antennas on sloped roofs, a safety belt must be worn, for which fixed hook points must be provided, as well as non-slip footwear. Work shall be suspended when it rains, snows or the wind speed is higher than 50 km/h.
- During assembly and installation of the equipment, there must be no connection to the general electrical grid, remaining disconnected until the installation is completely finished.
- Furthermore, all the applicable local provisions shall be complied with.

1.22 IMPLEMENTATION OF THE WIND TURBINE'S PLATFORMS, PREVENTIVE MEASURES PER WORK PHASES.

1.22.1 LEVELING. EARTHWORKS

General execution conditions.

- The manner and order of execution and the means used in each case shall be adapted to that set forth in the technical documentation.
- Fixed external reference points shall be arranged around the perimeter of the leveling area to be used for all the readings of elevation lines and horizontal and vertical movements of the points indicated in the technical documentation. The readings shall be noted in an inventory to be monitored by the Construction Management Team.
- The position and the solution to adopt for the installations, should they exist, that may be affected by the leveling, as well as the safe distance to be maintained from aerial electricity lines shall be requested from the distribution companies.
- Rock slabs and constructions that surpass the limits of the leveling area shall not be removed nor have their shorings removed without prior authorization from the Construction Management Team.
- Solutions for natural surface or deep watercourses, a solution to which is not provided in the Technical Documentation, shall be resolved by requesting Additional Documentation. The accumulation of superficial water shall be prevented, especially next to sloped edges.
- Stumps and roots longer than 10 cm shall be removed to a depth no less than 50 cm.

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1.22.2 CREATION OF AGGREGATE BASE PLATFORMS AND PAVING

- A new layer shall not be spread after rain until the former one has dried, or it shall be scarified, adding the following drier layer so that the final moisture level is that required.
- In the event of having to dampen a layer, it shall be done without forming pools of water.
- Backfilling work shall be stopped when the ambient temperature in the shade falls below 2° C.
- The passing of vehicles and machinery on compacted layers shall be avoided and in any event, the tires should not pass over the same parts of the surface leaving marks.
- In general, the screed and backfill used for the leveling shall be treated as the top of the slope and the density to be achieved shall not be less than the surrounding ground.
- Work to prevent the erosion of permanent slopes, such as plant coverage, ditches, shall be performed as soon as possible.
- When vibrating rollers are used for compacting, the last few turns shall be applied without vibration. The transition between cleared slopes and fill areas shall be made by smoothing the intersection.

1.22.3 DRAINAGE

- Generally, drainage for backfill areas adjacent to masonry work shall be created before or at the same time as said backfill.
- If an unexpected anomaly is found during digging operations, such as variation in the layers and/or their features, gas fumes, construction debris, archeological remains, etc., the work will be halted at least in that specific area, and the Construction Management Team shall be notified.
- When an urgent problem arises due to unforeseen circumstances, the Constructor shall provisionally take the appropriate measures, based on an assessment thereof, and shall notify the Construction Management Team as soon as possible.

1.22.4 EXCAVATION - REMOVAL

- General execution conditions
- The manner and order of execution and the resources used in each case shall be adapted to that set forth in the technical documentation.
- Before starting excavations, the surveying performed and the traffic routes that go around the cut shall be approved by the Construction Management Team.
- The position and the solution to adopt for the installations that may be affected by the excavation, as well as the safe distance to be maintained from aerial electricity lines shall be requested from the distribution companies.

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BEFORE EXCAVATION:

- When trees must be felled, the area shall be marked, the trees will be cut at their base, securing them beforehand and subsequently felling them.
- In order to provide the operator with the essential equipment for any situation, the following shall be available on site: a set of levers, wedges, bars, stays, mattocks, planks, flanges, cables with loops or hooks and canvases or plastic sheets, as well as helmets, weatherproof equipment, hard soled boots and other resources that may serve for certain eventualities or help the operators that may suffer accidents.
- The machinery to be used shall remain a safe distance from the electricity lines.
- There shall be a differential circuit breaker at the conductors' input connection for temporary electrical installations, pursuant to the applicable legislation Electrical Installations. Earth connection.

DURING EXCAVATION:

- Before accessing public roads, heavy-duty vehicles shall have a horizontal section of firm earth at least one and a half times the distance between the axles, and at least 6 m long.
- Ramps to move trucks and/or machinery shall conserve the side slope required by the ground with the angle of the slope no greater than that set forth in the technical documentation.
- The ramp's minimum width shall be 5 m, widening at curves and the slopes shall be no greater than 11 and 8%, depending on whether they are straight or curved sections. In any event, the maneuverability of the vehicles used shall be taken into consideration.
- The working area for each machine in its area shall be marked. Every time a stationary vehicle or machine starts up unexpectedly, it shall trigger an acoustic signal.
- Whenever in reverse or if the driver lacks visibility, they shall be helped by another operator not in the vehicle. Maximum precautions shall be taken when the vehicle or machinery moves to a different site and/or itineraries overlap.
- When it is essential for a load-bearing vehicle to approach the edge of the excavation area during or after the excavation, safety wedges shall be positioned, and the ground resistance to the weight of the vehicle shall be checked previously.
- When the machine is located above the area to be excavated and at the edges of excavated areas, the vehicle used shall be a rear excavator, provided this is appropriate for the ground, or the improvement work shall be performed by hand.
- The vehicles' and machines' controls and levels shall be checked before work starts and before removing the safety lock.

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- Tumbling excavation, in which the foot of a mass is hollowed out in order to make it cave in, shall not be done.
- Excavated ground, or other materials, shall not be accumulated next to the edge of the excavated area, and should be separated from the edge by a distance no less than twice the depth of the excavated area at this edge unless authorization is provided for each case by the Construction Management Team.
- When the excavated ground could transmit contagious diseases, it shall be disinfected before being transported, in which case, it cannot be used as backfill, and the staff handling it must be properly equipped.
- Improvement and clearing of the excavated areas' walls shall be performed for each partial depth no greater than 3 m.
- In areas and passageways with fall risks greater than 2 m, the operator shall be protected by a safety belt attached to a fixed point or scaffolding or provisional handrails shall be in place. When the movement of operators around the edge of the slope or vertical cut is essential, handrails shall be attached facing the outside of the excavated area and the operators shall move on the wooden boards or equivalent load distribution boards. The entire excavated area shall be sufficiently lit while work is performed.
- No work will be carried out simultaneously on the lower side of another work site.
- When an urgent problem arises due to unforeseen circumstances, the Constructor shall provisionally take the appropriate measures, based on an assessment thereof, and shall notify the Construction Management Team as soon as possible.
- At the end of the day, no excavated walls that appear in the Technical Documentation as requiring cribbing should be uncribbed and the loose blocks that may become detached shall be removed.
- The evacuation routes for operators in the event of an emergency must remain clear at all times.

1.22.5 EXCAVATIONS – DITCHES AND PITS.

General execution conditions

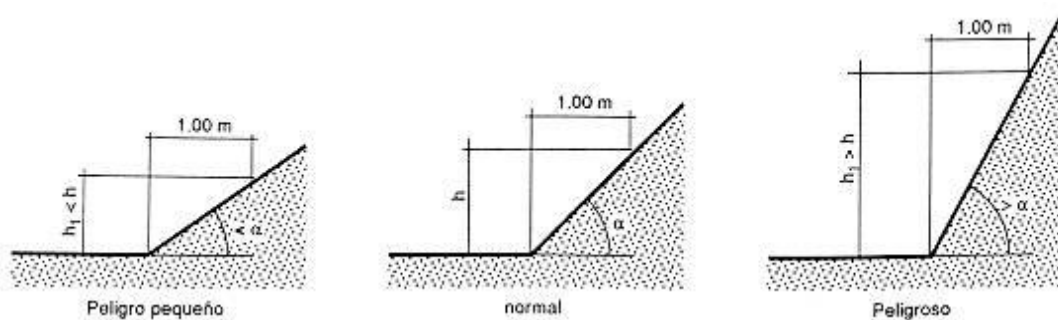
- The manner and order of execution and the means used in each case shall be adapted to that set forth in the technical documentation.
- Before starting excavations, the surveying performed and the traffic routes that go around the cut shall be approved by the Construction Management Team.
- The position and the solution to adopt for the installations that may be affected by the excavation, as well as the safe distance to be maintained from aerial electricity lines shall be requested from the distribution companies.

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- Fixed reference points shall be placed in areas that cannot be affected by the excavation, which shall be used as reference for all the readings of elevation lines and horizontal and/or vertical
- Movements of the points on the ground and/or nearby buildings identified in the Technical Documentation. Daily readings of the movements referring to these points shall be noted in an inventory to be monitored by the Construction Management Team.
- A detailed written record of the control and monitoring measurements taken shall be available on site.
- The entrance of surface water into the excavated areas shall be prevented, pumping it as soon as possible, and in order to keep the bottom of the excavated area clean, the measures provided in the technical documentation shall be taken and/or Additional Documentation shall be requested from the Construction Management Team.

When mechanical excavation equipment is used, such as rear excavators in cribbed ditches, it shall be necessary that:

- The excavation of ditches shall take place with a provisional slope grade that is appropriate to the ground characteristics, and any excavation with a grade that is greater than the natural slope must be considered dangerous.



- The ground can withstand a sloped vertical cut for this depth, checking the Foundations. Retaining walls. Slopes documents.
- The separation between the machinery's location and the cribbing is no greater than one and half the depth (P) of the ditch at this point.
- Rock slabs and constructions that surpass the edges of the ditch or pit shall not be removed nor have their shorings removed without prior authorization from the Construction Management Team.
- If it is observed that the bottom of the cut rises up when a strip is excavated, work must be halted and the strip must be refilled, as an initial preventive measure. If heaving occurs, gravel and/or loose sand is preferred, and the Construction Management Team must be notified.

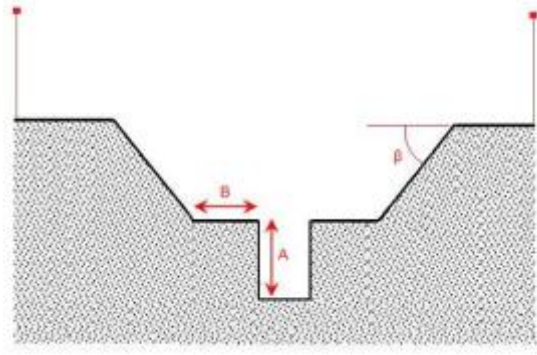
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- If any unforeseen anomaly is discovered during excavation, such as soft or flooded ground, gas leaks, construction debris or archeological remains, work shall be suspended, at least in this specific area, and the Construction Management Team shall be notified.
- When an urgent problem arises due to unforeseen circumstances, the Constructor shall provisionally take the appropriate measures, based on an assessment thereof, and shall notify the Construction Management Team as soon as possible.
- The pooling of surface water at the bottom of the excavated area, which may damage the grounds or adjacent estates, shall be prevented.
- When vehicles are operated in the normal direction of the excavated area, the marked zone shall be extended to twice the depth of the excavated area in that direction and no less than 4 m when reduced speed signs are used.
- The storage of materials and earth removed when excavating deeper than 1.30 m shall be positioned more than 2 m from the edge of the cut. When the excavated earth is contaminated, the earth and the relevant excavation walls must be disinfected.
- One operator shall remain outside in order to help and raise the alarm in the event of an emergency, whenever operators are working inside ditches or pits that are deeper than 1.30 m.
- The last section of the ditch adjacent to the turbine's foundation should be deep enough to reach the flexible tube embedded in the concrete of said foundation.
- The height of this last section rises gradually from 1.30 m until reaching approximately 2 m. in depth, as shown in the picture below.



The drawing below shows the safety conditions that must be met by the last section of the ditch.

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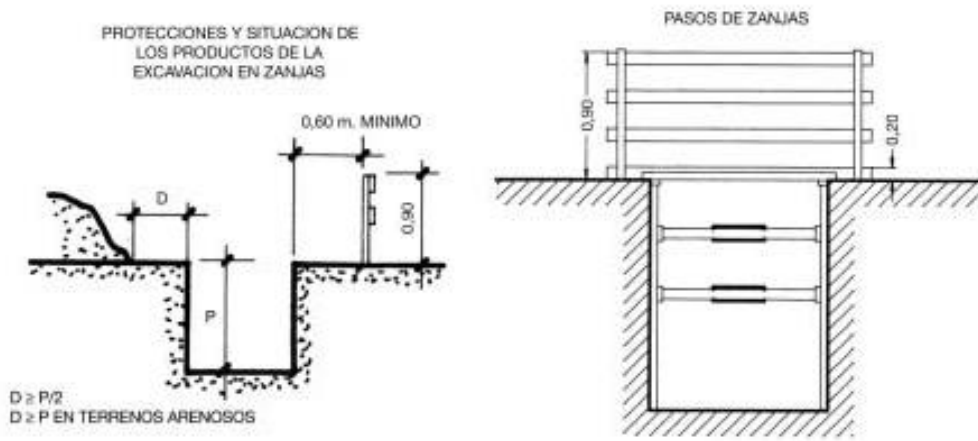


- The maximum depth of A – the last section of the ditch– should not exceed 1.30 m.
 - A berm will be built with a B plateau no smaller than 0.60 m.
 - Angle β will not exceed 30° .
 - A stopper-like mesh will be laid around the slope's perimeter at least 1 m from the edge.
- Additionally, during work inside this ditch section, a safety catch will always be kept on the outside.
 - Work shall not be performed simultaneously at different levels of the same vertical side and safety helmets shall always be worn.
 - Minimum separation distances between operators shall be marked according to the tools they are using.
 - In cuts deeper than 1.30 m the cribbing must exceed the ground surface level by at least 20 cm on ground level and 75 cm on the upper edge of the slopes.
 - Maximum precautions shall be taken after work interruptions of more than one day and/or after changes in the weather, such as rain or freezing.
 - The cribbing should not be bumped into during excavation work, nor should cribbing frames or elements be used for climbing up or down. Loads such as pipes should not be hung from struts; instead, they must be hung from elements expressly calculated for this purpose, located on surface.
 - Ditches deeper than 1.30 m shall be equipped with ladders, preferably metallic, that exceed the upper level of the cut by 1 m. There shall be a ladder for every 30 cm of open ditch or fraction thereof, which shall not be blocked and shall be correctly braced crosswise.
 - At the end of the day or during long intervals without work, the mouths of the pits deeper than 1.30 m shall be protected with a resistant board, mesh or similar item. In general, the cribbings or part thereof shall be removed only when they are no longer required, and they shall be removed in horizontal sections, starting at the lower part of the excavated area. In order to provide the operator with the essential equipment for any situation, a set of levers, wedges, bars, stays, mattocks and

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planks shall be available, which shall not be used for cribbing but reserved for the rescue team, in addition to other resources that may serve for certain eventualities or help the operators that may suffer accidents.

* At night, if the area is not marked off to prevent the entry of people and vehicles, the danger zone must be signaled with red lights at intervals of no more than 10 m.



- Furthermore, all the applicable local provisions shall be complied with.

BORED WELLS:

If applicable, attach Appendix.

1.22.6 STEEL AND IRON WORK

General execution conditions

- Combustible materials shall be stored away from heat, fire or sparks.
- Electric drills and other electric portable machinery must have double insulation or be grounded.
- Earth connection.
- The condition of the connections shall be checked on a daily basis.
- Furthermore, all the applicable local provisions shall be complied with.



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ERECTION ON SITE AND CRANE HOISTING.

- Before hoisting the mesh, the condition of the crane cables must be examined and
- Tested in order to verify their characteristics and ensure that it is safe to work with them.
- Special precautions must be taken to avoid any accidents that could occur if the boom or the mesh were to cross the electrical lines near the work site or along the path taken by the former as they are moved. The minimum safety distances from electrical lines must be taken into consideration.
- Driving or parking is not allowed under suspended or transported mesh, except when it is necessary to implement the work.
- The mounted steelwork will be carried to the hook suspension point of the crane through slings, which will hold it from two distant points to avoid any undesired deformation and displacement.
- Suspended pillars and beams will be placed on site using crane hooks. This maneuvering will be guided by qualified personnel.
- No climbing on the reinforcement is allowed.
- Walkways (60 cm at least) shall be installed to facilitate the circulation slabs, etc. during the setup of steel rods to offset negative stress (or laying of the mat reinforcement).
- Anchor points shall be left in place in order to tighten the safety belt clamp cables, which must be resistant enough to support the stress levels to which they will be subjected.
- If it is not possible to assemble the mesh on site and hoist it with cranes, instead requiring assembly of the mesh in its last support position, work platforms shall be set up at the appropriate height with handrails at a height of 0.90 m, a middle batten and a 0.20-m skirting board. For both types of assembly, when an electric nutrunner is used, it must have Class III insulation.
- Work shall be suspended when it rains, snows or the wind speed is higher than 50 km/h; in this last case the tools and materials that may become detached shall be removed.
- Operators charged with assembly shall be equipped with safety gloves and boots and shall use a safety belt when necessary.

1.22.7 FORMWORK

General execution conditions

In order for the Construction Management Team to monitor the formwork removal time, the maximum and minimum daily temperatures, and the date on which the concrete was poured for each element, shall be noted on-site as long the formwork and formwork removal tasks are performed.

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DURING COMPLETION OF FORMWORK

- Newly cut wood that is in contact with the concrete shall be whitewashed or washed with chalk water first, reused wood shall be free of concrete or impurities, have no warps or cracks, meeting the same general conditions as wood received for formwork. When this point is not verified, the number of uses shall be no more than six.
- In general, joints shall be arranged so as to favor the compression force on the wood. The brad quality shall not be lower than that defined in UNE Standard 17033.
- The minimum length l of the brads used in attaching the wood elements shall be taken from Table 1 depending on the thickness of the pieces of wood to be attached, where e_2 is the thicker one or equal to that of e_1 .

Table 1

	$e_2 \leq 2e_1$	$e_2 > 2e_1$
l en mm	$e_1 + e_2$	$3e_1$

- The minimum number N of brads to be used in the reinforcing joints for strained sections only subject to the action of the 2.5 mm diameter brads can be found in Table 2 for each length e_1 of the smallest thickness of the sawed wood.

Table 2

E_1 mm	20.100	25.100	30.100	52.150	65.150	76.150
N	15	20	25	30	40	50

For diameters O greater than 2.5 mm the number N shall be reduced by $2.5/O$.

- The brads shall be evenly distributed along the contact surface between the two pieces to be joined, as far apart from each other as possible, separate from the edges and between axes no less than 6 diameters of the brad along the grain of thicker wood and 10 diameters along the grain of thinner wood.
- Double fishplates shall be used whenever possible.

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- Whenever there is room on the surface to be nailed, small diameter brads should be used on hard wood.
- Brads shall be inserted with a slight angle and at differing angles from each other. When they are going to be riveted on the other side, they must be long enough to protrude at least three times their diameter, bending them in the direction of the wood grain.
- Joints between planks of linings shall be made, ensuring that the adjacent ones are not joined in the same place.
- Joints on ribs, struts and cross beams shall have double fishplates that are equally squared and the same length on each side of the joint, no less than twice the size of the larger side of the squaring being joined.
- The cribs must be duly watertight, and therefore sawn wood in contact with the concrete must be placed flush.
- There must be at least one opening in the lower part of the support elements.
- The edges of the linings must be tied to other linings or to auxiliary elements such as collars at the top of the support elements.
- The crib tolerances in on-site layout, dimensions, flatness and plumb lines shall be those defined in the regulations corresponding to the concrete element to be poured. The variation in support elements and beams cannot be more than 5 mm for local movement and must be less than one thousandth of the span for overall movements.
- Plank scraps shall be placed under the strut wedges when the ground is soft.
- Before pouring the concrete, the surface of the crib must be checked to ensure it is clean and moist, and that the reinforcing and auxiliary pieces that must be embedded into the concrete, such as hoses and anchoring pins, have been correctly placed.
- The fresh concrete shall be poured into the cribs at the lowest possible height from the bases or the previous layer, avoiding impact and preventing fresh concrete from accumulating at certain points.

AFTER FORMWORK IS COMPLETED

- In general, the formwork flitches should not be removed until at least 7 days have elapsed for support elements and 3 days in other cases, and prior approval must be given by the Construction Management Team.
- When removing the formwork on soffits and falsework planes, the time established in the applicable regulations for “Structural Concrete” after prior approval is given by the Construction Management Team. The wedges shall be loosened, leaving the bottom 2 or 3 cm from the concrete element, for

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the next twelve hours, checking whether the deflection produced is within an admissible range for the slab.

- When the lining resists stripping, it must be moistened thoroughly before forcing it, or a surface action form-release agent must be applied that meets the specific conditions established for applicable regulations for "Structural Concrete Structures".
- The wood used shall be clean and free of nails when stored, protected from sunlight and rain and piled in a way that allows for ventilation.
- Operators and/or hand carts can move about the soffits by distributing
- Vibrations from motors must not be transferred to the formwork.
- Work shall not be done on formwork subjected to winds stronger than 50 km/h or in the proximity of high voltage electrical lines or in the same vertical line as other unprotected operators.
- Flammable substances must not be stockpiled near wood formwork, and at least one handheld fire extinguisher must be available at the work site.
- Furthermore, all general provisions related to the General Ordinance for Occupational Safety and Hygiene shall be complied with.

1.22.8 CONCRETING

General execution conditions

All the footings that support the wind turbines are performed.

Taking into consideration the hazards that have been identified, the following preventive measures must be taken:

- The safety, verticality and leveling of the formwork must be checked before starting to pour the concrete.
- Concrete must be not poured at one single point in order to not break the formwork.
- When the concrete is poured directly on the footing's formwork, given that the concrete mixer must approach the edge of the ditch, safety stops must be installed, checking the ground's resistance to the weight of the mixer. These stops must be positioned before the concrete is poured.
- Knocking the formwork must be avoided during the concreting work.
- When the dump truck is used to transport and pour concrete, it must never be poured directly into the ditch, but at the edge thereof, ensuring that the dump truck rests on the ground. Safety stops must be positioned next to the ditches for the front wheels.
- Frequent breaks must be taken when using the vibrating needle if the work is continuous and prolonged.

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- The mouths of the ditches or pits with dangerous slopes must be protected by using handrails of sufficient resistance, that are at least 90 cm tall with intermediate bars and a baseboard.
- If the work requires lighting, it must be provided via grounded, insulated turrets that must be equipped with weatherproof projectors that are powered via a general site electric panel.
- If portable lighting is required, it must be provided by means of 24 volt lamps. Portable lighting must be equipped with a protective grill and shell and electrically isolated wires.

POURING CONCRETE DIRECTLY VIA A SPOUT

- Prior to starting to pour the concrete directly with the concrete mixer, heavy safety stops must be installed where the mixer is going to be positioned. It would not be sensible to position it on ramps with steep inclines, to prevent possible overturning.
- The wheels of the concrete mixer must be at least 2 meters from the edge of the excavation.
- Workers must not be located behind vehicles in reverse that, furthermore, must be directed from outside of the vehicle. Neither must they be located where the concrete is to be poured until the concrete mixer is in the pouring position.
- Solid handrails must be installed at the front of the excavation protecting the spout's path. Safe resting positions must be made available in those locations where concrete is to be poured on a half slope. The pouring operation must be led by the manager, who will monitor to ensure that no unsafe work is performed. Once the concreting has been completed, the spout must be collected and attached to the concrete mixer in order to prevent uncontrolled movements thereof.

POURING VIA A PUMP

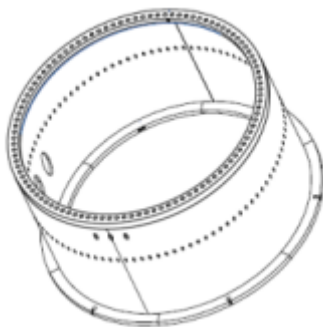
- The team responsible for handling the concrete pump must be trained in this type of work.
- The concrete pump tubes must be rested on trestles, securing the parts that are susceptible to movements.
- The final pouring hose must be managed by a minimum of two operators, in order to prevent falls stemming from uncontrolled movements thereof.
- Before starting the concreting of a specific surface, a series of wooden safety boards must be laid out upon which the workers managing the concrete pouring hose must rest.
- The assembly and disassembly of the concrete pump's tubing must be led by a worker that is specially trained in the prevention of accidents caused by blockages and internal pressure.

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- Before starting the concrete pumping, the duct must be prepared by sending dosing mortar down it in order to prevent it from becoming plugged or blocked.
- The cleaning ball should not be inserted without placing the collection net at the outlet of the hose first after passing throughout the entire circuit. If the ball becomes blocked, the machine must be stopped, reducing the pressure to zero and then disassembling the tubing.
- The operators must attach the final hose before inserting the cleaning ball to remove solid elements, leaving the area before starting the process.
- The concrete pump's oil circuits must be checked regularly, filling in the maintenance log that must be presented at the management's request.
- All machines that work via electricity must be equipped with the corresponding grounding protections and differential circuit breakers, ensuring the connections and cables are in good working order.
- Electrical connections must be made via watertight and weatherproof mechanisms.
- Work zones must be safely and easily accessed and must be kept clean and orderly at all times, taking the necessary measures to that walking around them is not dangerous.

1.23 POSITIONING OF THE SPOOL / FOUNDATION RING;

The first section that is put in place is positioned after laying the first reinforcement and flowable fill, as per the instructions described previously.



Once next to the footing, it must be positioned it within the footing using a crane, in the same way as the reinforcement was lowered, surround the spool with reinforcement as prescribed by the Construction Management Team. Once this operation has been completed, the spool or foundation ring are leveled so that it can be attached to the rest of the wind turbine. Finally, the overall unit is concreted in order to complete the operation. The concreting process has been described previously.

When the foundation ring is received on the wind farm, its reception records must be filled in (delivery note, load tracking record and quality record), verifying the good condition of the section and noting down any incidents that may have occurred during the transport, all duly signed by the carrier.

Such records must be signed by the Civil Engineering Works manager.

The material to be received should comprise the following:

- Foundation Ring.

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- Leveling legs for each foundation ring (reference according to corresponding foundation product). The number will vary according to the number of holes on the foundation's lower flange.
- Nuts for each leveling leg.
- Corrugated pipe.

Unloading of Foundation Rings

- Foundation rings are carried to the wind farm individually.
- Foundation rings will be unloaded using lifting eyes and chains suitable to the weight to be handled.
- Hoisting tools should be visually inspected before use.
- All such hoisting tools must be CE certified.

a) Tools

- Swivel eyes. The screw stem should be fully threaded.
- Slings or chains of 5 m each.
- 3 shackles

b) Assembly of the Hoisting Tools

In order to mount the lifting eyes on the foundation's upper flange, please follow the instructions below:

- 1.- Insert one of the ends of each sling in the crane's hook.
- 2.- Insert the shackles in the other end.
- 3.- Insert the lifting eyes in the shackles.
- 4.- Carry the assembly to the foundation ring area.
- 5.- Fasten lifting eyes to the foundation's upper flange forming 120° angles between them to secure that the load is evenly distributed among all slings. Position them on the vertical axis of the anchorage holes of the leveling legs.

c) Unloading Procedure

- 1.- Start loading the crane very slowly up to approximately 5 T.
- 2.- Make sure that the crane's hook is located near the center of the ring.
- 3.- Loosen up the fasteners holding the ring.
- 4.- After making sure that the foundation will not move unexpectedly, continue the loading process until reaching the total weight.
- 5.- Carry the ring to a smooth and robust spot on the platform, capable of withstanding the weight of the foundation.
- 6.- Once the foundation's position is secured, loosen the lifting tools.

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d) Ring Leveling Procedure

- Leveling will be performed on the sole plate free of any obstacles and before placing any steelwork.
- Installing the leveling screw jacks from beneath the suspended load is absolutely forbidden.



There are two alternatives:

a) Placing the leveling screw jacks one by one.

- At least two workers will be necessary.
- The first leveling screw jack will be placed on a mark previously made on the ground and the supporting nut will be regulated at 88 cm.
- The ring will be brought down manually until the rod goes through the applicable hole of the flange.
- The ring will be brought down leaving it a few centimeters away from the screw, but without touching it.
- The locknut will be adjusted to the upper part of the flange for the leveling screw jack to come up with the ring and cause no interference when installing the next jack.
- The ring will be lifted and the process repeated for the next 6 jacks.

a) Installing several leveling screw jacks simultaneously.

- One worker for each jack will be necessary.
- Neither the body nor the legs can be placed beneath the ring.

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- Once all 6 jacks have been installed, the flange will be leveled off. The topographer should remain away from the edge of the slope and on the other side of the marking.



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- A ladder will be used to place the grader. One worker will hold the ladder while another one climbs it. The worker reaching the top will wear a harness and will attach the shock absorber-fitted hitching line to the lifting eye.



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1.24- ASSEMBLY OF THE BOLT CAGE; ANCHOR CAGE

a) Description of the assembly

The operation consists of assembling the Bolt Cage as indicated in WKI 0018-0743 V01.

In order to do so, first the structure is assembled upon which all the cage's bolt are to be attached.

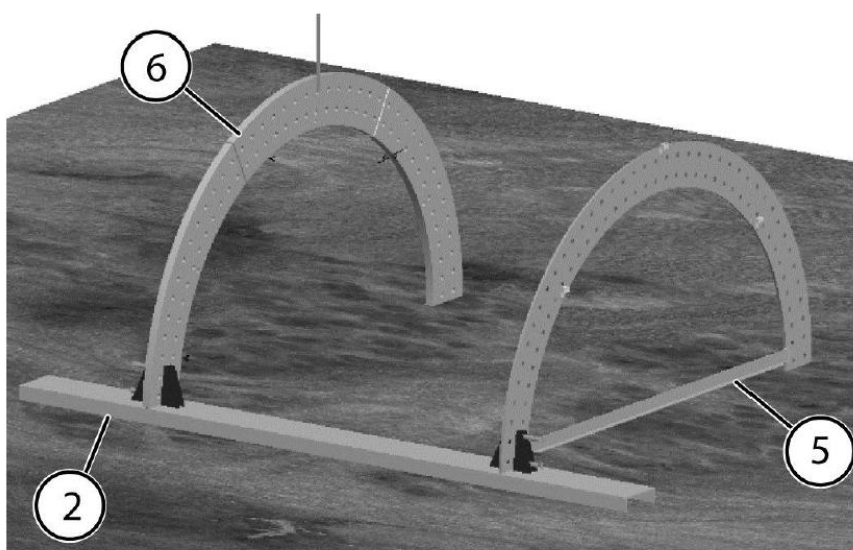


Figure 15-1: Base flange attached to fixture.

Once the structure is assembled, all the bolts are inserted with the help of some foam blocks, as can be seen in the image below.

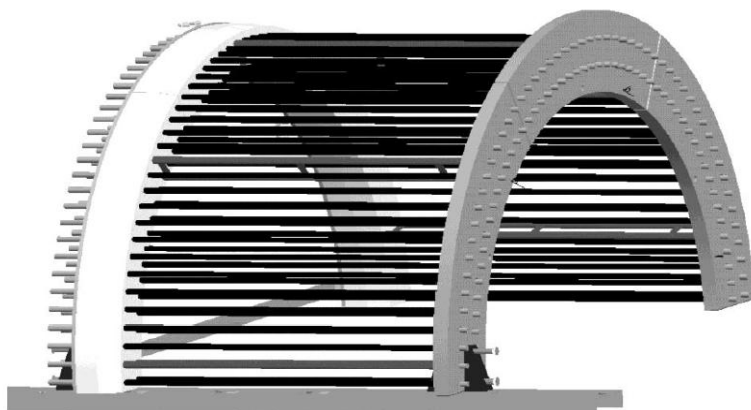


Figure 19-1: Mounting all the distance pipes.

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Once the two halves of the cage are assembled, they are positioned upright with a crane truck. Once upright, the structure's feet are attached, the two halves are attached together and the cage is leveled.



Figure 30-9: Levelling anchor cage.

In order to complete the assembly, the joint plates between the two parts of the halves of the cages are installed in the top part of the cage using ladders.



Figure 30-12: Mounting of fishplate.

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The finished cage will look like the following image:



Once the cage's foundations have been laid, the initial structure and foam blocks required for the assembly of the cage are removed and the area is cleaned so that it is ready for the assembly of the tower.



Figure 31-2: Removing template flanges.

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Figure 31-6: Pressure cleaning.

b) Most common hazards

- Hitting people with large hanging pieces while being transported.
- Trapping during placement maneuvering.
- Falling from heights.
- Cutting caused by the use of handheld tools.
- Cuts or bumps resulting from the use of machine tools.
- Entrapment of hands or feet when receiving parts.
- Falls on ground level.
- Displacement or uncontrolled fall of precast parts.
- Collapse of precast parts.
- Risks derived from performing work under strong wind conditions.
- Overexertion.
- Projection of particles.
- Dust.
- Noise.

c) Preventive Standards or Measures.

- 4 technicians must be assigned to assemble a bolt cage.
- The team of 4 technicians is only allowed to assemble one cage per day.
- Two technicians must help to lift up the cage.
- Before trucks arrive at the work site, their turning radius should be established.
- Access tracks should be prepared analyzing obstacles according to transport, width and height.

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- Access to the assembly site by any unauthorized person must be prevented and the work area appropriately signed.
- Compacted areas on the work site should be ready to facilitate the circulation of trucks and carriage of precast material.
- Assembly operations will be carried out during daytime with sufficient natural light. Should it be absolutely necessary to work without natural light, artificial lighting will be provided in the entire work area with a minimum intensity of 100 lux.
- The condition of the lifting slings and crane cable will also be monitored. They should be neither damaged nor have any loops. The number of broken wires in a piece of cable should not exceed 10% in any case and the breakage load capacity must be 6 times higher than the use rate.
- No faulty work tools or elements must ever be used (hooks, cables, winches, etc.) as their resistance may be impaired.
- The status of hoisting elements must be checked daily (slings, rocker arms, safety locks, etc.).
- Load lifting operations will be halted under strong wind conditions (60 Km/h), frost or heavy rainfalls that may cause the work surface to become slippery.
- No simultaneous work must be performed on the same vertical axis at different levels to prevent materials and objects from falling onto people at lower levels.
- The assembly team manager should be the most experienced and qualified person in charge of this operation. He should be acquainted with the risks inherent to each job and, in case of any doubt, he should consult with his immediate boss or the prevention technician.
- If the crane operator does not have enough visibility during operations in close proximity and unloading, he should be aided by a signaler.
- During loading and unloading operations, nobody should remain inside the truck cabin or beneath any hanging loads.
- Loads will be brought up and down slowly and vertically. Pulling at inclined angles is prohibited.
- During all assembly phases where falling from height may occur, a safety harness must be worn.
- Working or remaining in areas where hanging pieces are carried is prohibited due to the collapse risks involved.
- ANY PERSON authorized to be on the work site (assembly personnel, crane operators, carriers, etc.): the use of PPEs is mandatory: safety helmet and footwear. The presence of unauthorized personnel on the work site is STRICTLY FORBIDDEN.
- When maneuvering suspended loads NO PERSON should be beneath them, on their way or within the area marked for the operation and the radius of action (including underneath the crane arm) as the loads may fall off in case of breakage of the slings, chains, crane, etc.
- During all operations carried out at a height above 2 m, the operator must be held by a safety harness attached to a higher fixed point.
- If portable ladders are needed, they must be previously checked to verify the condition of the steps, etc. If any parts are found damaged, they must not be used and must be replaced by another in a

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good state of repair. The inclination angle must be approximately 75° with respect to the horizontal one.

- All the measures established in the Health and Safety Plan related to the use of cranes, foundations (use of reinforcement, concrete pouring, formwork and removal of formwork), working on slopes and excavations, use of tools and machinery, use of ladder, etc. must be follow.

1.25 LAYING OF TRITUBE

Lay the tritube in the ditch and the cover this material that connects the various generators. It must be performed using a boom truck with a cable coil on a support as can be seen in image no.1.

The tube is handled manually so that it is correctly positioned and laid in the ditch, and once it the laying process is complete it is covered and compacted.

Image no. 1



Image no. 2



Image no. 3



Image no. 4



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2. ELECTRICAL WORK

2.1. BACKGROUND

This Appendix makes reference to the "Health and Safety plan" document that it accompanies and in which the project information and the majority of the hazards and safety measures that are applicable to the work are described.

This Appendix describes and analyses the different hazards and safety measures for the high, medium and low voltage tasks, as well as the general organization standards for these electrical tasks.

2.2. THE IMPORTANCE OF PROTECTION AGAINST ELECTROCUTION

- Electrocution is due to the passing of electricity through the human body. In general it is a very serious and relatively frequent among the most typical accidents: one in every 200,000 workers suffers a mortal accidental due to electricity each year.
- Therefore, the protection and safety of the worker must be maximized, above all, in work related specifically to electricity, as is the case in the project we are undertaking.

2.3. EFFECTS OF ELECTRICAL SHOCKS ON THE HUMAN BODY

During accidental contact with points of different voltages, the intensity of the flow of the current is the opposite to the resistance that body provides. This is important because it is the intensity that produces the injuries stemming from accidental electrocution. Thus, it is important to have a good grounding system, so that in the event of an accident, this intensity is minimized.

Injuries due to accidental electrocution may include some of the following:

- Third degree and serious burns, including internal burns, due to Joule effect heating may occur.
- Electrolysis of the blood if it is a direct current, destroying essential elements in the blood such as hemoglobin.
- Currents interfering with the human body's systems and apparatus, which bearing on the frequency may include:
 - The nervous system, affecting control over the vegetative functions, especially the heart and the lungs.

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- The muscles, provoking the involuntary and sustained contraction thereof (muscular tetanization).
- The heart, provoking the weak and uncoordinated contraction thereof at a high frequency (ventricular fibrillation), reducing its pumping ability, which is equivalent to cardiac arrest.
- Therefore, the first aid hut must be equipped with items that it does not normally contain, such as; oxygen masks and pump, mouthpieces for mouth to mouth respiration, adrenalin injections, etc. However, the most important thing for these types of accidents is appropriate training for staff confronted by this type of situation, so that they act quickly, calmly and always know what to do and most importantly do not exacerbate the problem by acting incorrectly.

2.4. DESCRIPTION OF THE WORKS

With regard to the aforementioned work, and for the purposes of assessment, prevention and correction of hazards, the following tasks must be considered.

- Working and operating in low-voltage facilities.
- Work performed without voltage (at low voltage).
- Live work (at low voltage).
- Handling portable machinery and lamps.
- Handling accumulator batteries.
- Working and operating in medium and high-voltage facilities.
- Handling of interrupter devices (disconnectors and circuit breakers).
- Handling transformers.
- Work performed in proximity to working installations.

2.5. CONSIDERATIONS BEFORE PERFORMING WORK IN AN ELECTRICAL INSTALLATION.

The following steps must be adhered to before performing work in an electrical installation or part thereof:

- Using a visible break, cut all possible voltage sources.
- Interlock or block, where possible, all the cut-off equipment.
- Report such situation to the supervisor, who will take charge of the said situation.
- Ground and short circuit all possible energized sources.
- Check the area work is to take place is de-energized.
- Ground and short circuit the area the work is set to take place.

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- Hang appropriate safety signs in the area the work is to be carried out.

2.6 WORKING AND OPERATING IN LOW-VOLTAGE FACILITIES, PREVENTIVE MEASURES.

The basic precautions for work and operations in low-voltage installations, in other words, for nominal voltages lower than 1000 V, are described below.

2.6.1 GENERAL PRECAUTIONS

- Before starting all low-voltage work, we must identify the conductor or installation where the work is to be performed.
- All installations are considered to operating at a low voltage unless they are proven to be doing otherwise using equipment intended for such purpose.
- The meters, rulers, oil dispenser handles, cleaning tools, etc. that are used must not be made of conductive material. Metal ladders must not be used for work involving voltages.
- Live work must not be carried out in premises where explosive or flammable materials are housed.
- Screens, grids, etc., must be used to prevent contact with energized facilities when work is performed nearby or intersecting with them, or the installation must be disconnected or short-circuited and grounded.
- Workers must be positioned on insulating platforms when using low-voltage devices in damp and wet premises or premises with dusty or corrosive atmospheres or premises that house accumulator batteries. Such platforms must not be stored in the aforementioned premises.
- Whenever possible, a low-voltage installation must be de-energized when fuses are replaced. If this is not possible, the circuit must be cut via the fuses; when re-energizing the service, the worker must be positioned so as to not be affected by an unexpected activation thereof.

2.6.2 PRECAUTIONS FOR ENERGIZED INSTALLATIONS

- Primarily, we must avoid live working, but if this is not possible, the following instructions must be adhered to:
- Position yourself on insulating objects (carpet, mat, dry wood, etc.)
- Use a helmet, low-voltage gloves, safety goggles and insulated tools.
- Suitable clothing without metallic accessories.
- Isolate the other low-voltage conductors close to the work area, including the neutral conductor.

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- Check the correspondence of each phases' input and output terminal blocks.
- We must also check that the customer's installation is short-circuited, ensuring there is return current before connecting each new output wire.

2.6.3 PRECAUTIONS FOR PORTABLE MACHINERY AND LAMPS.

- The power supply cable for portable machinery and lamps shall be perfectly insulated and shall be kept in a good state of repair.
- The power supply voltage of the portable tools and lamps used for work in ditches, pits, galleries, boilers, etc. must not exceed to 24 V.
- When portable tools require more than 24 V to work, at least one of the following common protective items must be used:
 - Insulating gloves.
 - Double insulation portable tools.
 - Grounded portable tool.
 - Protection from insulation defaults via differential relays.
 - Circuit isolating transformers.
- Portable lamps must be equipped with an isolating handle, appropriate protective device and isolating conductor and be of sufficient mechanical resistance.
- Ordinary portable lamps must not be used.

2.6.4 PRECAUTIONS FOR ACCUMULATOR BATTERIES

- Smoking and using flames is prohibited in the battery room.
- For all operations with electrolytes, appropriate safety equipment must be used (rubber gloves, apron, etc.).

2.6.5 SAFETY MATERIAL

- Low-voltage insulating gloves.
- Insulating carpets or mats.
- Isolating sheets and caps.

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- Voltage testers.
- Insulated tools.
- Signaling equipment (signs, barriers, flags, etc.).
- Portable lamps.
- 24 V safety transformers.
- Circuit isolating transformers.

2.7 WORKING AND OPERATING IN MEDIUM AND HIGH-VOLTAGE FACILITIES, PREVENTIVE MEASURES.

The basic precautions for work and operations in medium and high-voltage installations, in other words, for nominal voltages that exceed 1000 V, are described below.

2.7.1 GENERAL PRECAUTIONS

- Each work group must be equipped with the relevant safety material and an emergency first aid kit in order to provide first aid in the event of an accident.
- All work carried out in high-voltage facilities must first be subject to a Consignment Request or Discharge Request, in which the identity of the person making the request will be stated.
- Only visible breaks (if a circuit breaker is open, or the contact parts are visible or the relevant disconnectors are open) can be considered acceptable power outages in terms of staff safety.
- The following tasks must be carried out in order to work in any high-voltage installation:
 - Open all possible voltage sources with a visible break.
 - Interlock or block, where possible, all the cut-off equipment.
 - Ground and short circuit all possible voltage sources.
 - Check the lack of voltage. This check must be performed on each of the conductors and a suitable device must be used.
 - Hang appropriate safety signs.
 - Demarcate the area that is not live, and on certain occasions, position protective screens that prevent access to energized areas.
 - Opening or removing the switchgears' protective railings in an installation is prohibited before the conductors and equipment contained within are made de-energized. Consequently, energizing the installation without closing or replacing the railings is also prohibited.

Five golden rules:

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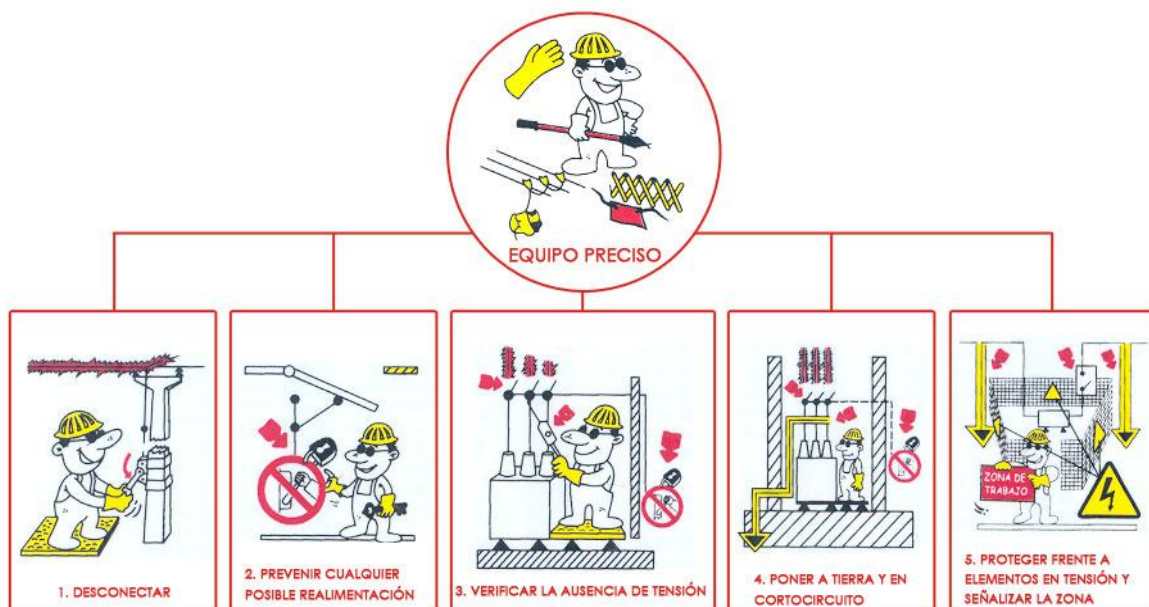
First rule: Open all voltage sources with a visible break, using circuit breakers and disconnectors that ensure the source does not close suddenly.

Second rule: Interlock or block, where possible, all the cut-off equipment, and place signs on their controllers.

Third rule: Check the installation is de-energized.

Fourth rule: Ground and short circuit all possible voltage sources.

Fifth rule: Hang appropriate safety signs, demarcating the work area.



First rule:

- A "visible break" is understood to be a separation between two points of the current (so that it cannot circulate), which can be checked visually.
- The separation distance must be of sufficient length for the operating voltage ("service voltage") of such installation. Higher voltages require greater separations.
- All insulated elements must have a sufficient level of insulation for the voltage for which they are to be used, they must be kept in perfect working condition and only be used by trained staff.
- According to the "First golden rule" the circuit must be charge and de-energized.

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- The visible break must establish a clear separation between the energized part of the installation and the part that is de-energized.

To perform this operation, the tools to be used are the following:

- Safety helmet.
- Insulating pole.
- Insulated gloves.
- Insulating mat.
- Insulated goggles.

Second rule:

The aim of this second rule is to prevent the circuits that are opened via visible breaks to become closed due to sudden failure of the circuit breaker.

The aim is to ensure that no sudden closures of the breaking equipment (circuit breakers, disconnectors) take place, either due to technical fault, human error or unforeseen circumstances.

This locking can either be mechanical, electrical, pneumatic or physical.

- **Mechanical locking** involves immobilizing the equipment's controller using padlocks, locks, chains, bolts, cotter pins, etc.
- **Electrical locking** involves preventing the equipment from working by opening the electric circuit's controller and motor.
- **Pneumatic locking** involves acting on the supply of compressed air and emptying the pressurized air chamber.
- **Physical locking** involves placing isolating equipment between electric contacts that prevents these contacts from closing. For example, placing an insulating board between the disconnector's blades and the fixed contacts thereof.

This Second rule states that as well as the locks inserted in the break equipment, posters, board or other signaling equipment must be positioned on the controllers thereof, which indicate that operations must not be performed.

These posters or boards must be carry standard symbols.

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This second safety rule is limited solely to signaling when locking a break device is not possible. Therefore, signaling is considered the minimum protection when the break equipment cannot be locked.

Third rule:

Checking that this part of the electrical installation is de-energized is performed by using suitable equipment. To perform this task, we must work under the assumption that there is voltage; therefore the equipment to be used must include the following:

- Safety helmet.
- Insulating pole.
- Insulated gloves.
- Insulating mat.
- Insulated goggles.
- Visual-acoustic voltage checker.

All insulated elements must have a sufficient level of insulation for the voltage for which they are to be used; they must be kept in perfect working condition and only be used by trained staff.

We must check there is no voltage at:

- The points where the voltage source has been opened.
- The area where the work is to be carried out.

The safe distance is the minimum distance that must exist between the worker and the energized part of the installation, measured from the closest energized point and any part of the worker, including tools or conductive material they may be carrying.

The safety distance depends on the installation's service voltage. The distance corresponding to the higher voltage displayed in the table below must be adhered to in the event of intermediate voltages. These safety distances are only applicable to installations that are not isolated.

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Tensión entre fases kV	Distancia mínima (**) m
Hasta 10	0.80
Hasta 15	0.90
Hasta 20	0.95
Hasta 25	1.00
Hasta 30	1.10
Hasta 45	1.20
Hasta 66	1.40
Hasta 110	1.80
Hasta 132	2.00
Hasta 220	3.00
Hasta 380	4.00

Fourth rule:

There must be two grounding and short circuiting systems at each side of the work area:

- One near to the visible break point.
- The other as close as possible to the area where the work is to be performed.

When the distance between these two grounding and short circuiting systems is small, using only one grounding system on each side of the work area is possible. This is acceptable when the grounding and short circuiting systems located at the outage points can be seen by the workers carrying out the task or are under their control.

Two types of grounding or short circuiting systems can exist in electric installations:

- Fixed grounding and short circuiting systems.
- Temporary, portable grounding and short circuiting equipment (grounding devices).

To perform this task, we must work under the assumption that there is voltage; therefore the equipment to be used must include the following:

- Safety helmet.
- Insulating pole.

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- Insulated gloves.
- Insulating mat.
- Insulated goggles.
- Fixed assembly short circuit and grounding equipment.

All insulated elements must have a sufficient level of insulation for the voltage for which they are to be used; they must be kept in perfect working condition and only be used by trained staff.

Fifth rule:

Signal and demarcate the work area or danger area (energized area), depending on the circumstances, with signs (boards, posters stickers, flags, etc.) of the standardized color and shape, with drawings, phrases or symbols that must be complied with in order to prevent accidents.

These safety signs are classified by their color and their shape:

The color indicates:

red	⇒	Prohibited or stopped
yellow	⇒	Warning or danger
green	⇒	Safety
blue	⇒	Mandatory

The shape indicates:

Circular ⇒ Obligation or prohibition

Triangular ⇒ Warning

Rectangular ⇒ Information

- Demarcation of the work or danger involves marking the edge of the area with barricades, tape or chains.
- These must be reflective or fluorescent and red in color.
- Depending on the size of the area with regards to the total size of the installation, either the work or danger or energized area will be signed and demarcated.

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- Therefore, when the work area is large, only the danger area (energized area) is signed and demarcated. In other situations, sign and demarcate the work area, which, as explained previously, is determined by the grounding and short circuiting points closest to where the work is to be carried out.
- This work area, once signed and demarcated, becomes and is referred to as the "**safe area**".
- This safe area must have an access path for workers and materials. The danger does not require an access path as the aim is for no one to access such area.
- When dealing with electric installations at different heights, not only must the ground be signed and demarcated, but also the height of the area; i.e. the area must be signed and demarcated in three dimensions.
- When work is performed at distances from energized parts that are inferior to the minimum safety distances provided in the Third and Fourth rules, screens made of insulating material must be positioned between the work area and the energized parts.

2.7.2 CUT-OFF DEVICE PRECAUTIONS (CIRCUIT BREAKERS AND DISCONNECTORS)

- To open or close a disconnector, we must ensure that it is of sufficient capacity; if this is not the case, we must use the corresponding circuit breaker.
- The following is necessary for staff carrying out manual operations with cut-off devices:
 - Insulating pole.
 - Insulating gloves.
 - Insulating mat or stool or insulating carpets.
- The use of at least two of the aforementioned protective items is mandatory for the previous precaution, while the use of all three is recommended.
- If the cut-off devices have manual controls, we must adopt all precautions so that it does not suddenly become active for any reason.
- In all cases, placing an easily visible notice on the cut-off device's handle, or on the switchgear's protection, instructing workers to not connect due to on-going work is mandatory.

2.7.3 PRECAUTIONS FOR TRANSFORMERS.

- The normal operation to de-energize a transformer is to open the low-voltage output and then open the cut-off device in the high-voltage section.
- To energize a transformer we must start by closing the high-voltage cut-off device.

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- A current transformer's secondary circuit must always be closed or short-circuited.
- Using flames close by oil transformers is dangerous, and if doing so, permission must be requested and the safety measures must be maximized.
- The same precautions for de-energizing an installation prior to work must be adopted when using high-voltage fuses.
- Appropriate fire extinguishing equipment must be at hand when working with oils. If this work is performed in the transformer's switchgear and a fixed fire protection system has been installed, we must ensure that it is in working order and ready to work.
- When work is performed in a transformer, except when working with oil, its fixed fire protection system must be locked in order to prevent sudden activation thereof.

2.7.4 SAFETY MATERIAL

- Insulating poles.
- High-voltage insulating gloves.
- Insulating carpets or mats.
- Isolating sheets and caps.
- High-voltage insulating boots.
- Insulated tools.
- Signaling equipment (signs, barriers, flags, etc.).
- Portable lamps.
- 24 V safety transformers.
- Safety belts, helmets, protective clothing, etc.

2.8 PRECAUTIONS FOR TEMPORARY GROUNDING SYSTEMS

- Temporary grounding systems are understood to be those systems that are temporarily attached to an energized electric installation via a conductor, which once it is consigned or discharged is ready for work to be performed.
- In order to ground an installation, we must first connect the grounding system's conductors to the grounding point and then connect them to the installation to be protected using special rods. The process is reversed to disconnect the grounding system.
- In order for the grounding and short circuiting systems to be as efficient as possible, they shall be positioned as close to and at both ends of the work area as possible.

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- Temporary grounding systems must have a perfect electrical connection, both with the metallic parts that we wish to ground and the plate, rod, etc. that form the grounding connection.
- The conductors used to make the grounding connection must be copper and of sufficient length.
- If the grounding system is made using pre-existing grounding disconnectors, we must ensure that these devices' blades are all closed.
- When working on an installation's general grounding system, work must be suspended during storms, line tests, etc.
- Before cutting off energized grounding circuits, we must connect a grounding conductor bridge at the location of the cut-off. The person performing this task must be completely insulated from electricity.
- Two elements of an installation must not be grounded with two separate grounding systems that are not in contact with each other given that they may be at different rated powers.

3. STRINGING OF CONDUCTORS

3.1 BACKGROUND

This Appendix makes reference to the "Health and Safety plan" document that it accompanies and in which the project information and the majority of the hazards and safety measures that are applicable to the work are described.

This Appendix describes and analyses the different hazards and safety measures related to the stringing of high, medium and low voltage conductors, as well as communication cables, both in ditches and accessible cable trays and troughs.

3.2 DESCRIPTION OF THE WORK.

With regard to the aforementioned work, and for the purposes of assessment, prevention and correction of hazards, the following tasks must be considered.

- Laying cables directly in ditches.
- Lifting layers of earth for cable ditches.
- Laying cables in aforementioned ditches.
- Covering ditches with previously lifted layers of earth.
- Stapling and connecting to the terminal in the installation.
- Laying and stapling cables in trays.
- Connecting control panel, controller and alarm cables to the terminal.
- Connecting cables in remote control interface bedplate to the terminal.

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- Removal of waste from work areas.

3.3 MOST COMMON HAZARDS

The following hazards are considered:

- Overlapping of work areas.
- Staff falling from heights.
- Vertical movements.
- Electrical hazards produced by: portable equipment, panels, etc
- Interfering with other companies.
- Falling objecting.
- Hazards produced due to a lack of cleanliness and order.

3.4 BASIC SAFETY REGULATIONS AND PROTECTIVE GROUP EQUIPMENT

See applicable VESTAS procedure

3.5 PERSONAL PROTECTIVE EQUIPMENT

See applicable VESTAS procedure

3.6 SPECIAL PRECAUTIONS FOR WORK PERFORMED IN UNDERGROUND GRIDS.

For all work performed in underground grids, we must comply with precautions set forth in the previous paragraphs that affect this grids. Furthermore, we must take the following conditions into consideration:

- Before starting any work on underground cable, the nearby terminals must first be short-circuited and grounded.
- Before cutting off an underground cable, we must first identify it and subsequently check it is de-energized using suitable equipment.
- If we must make new cut-offs on a cable in different locations to those which have been identified and tested to ensure it is de-energized but we have been unable to follow it along its entire length, we must carry out that set forth in the previous section once more.
- Excavations and ditches of certain depths must have a sufficient slope, taking the features of the land into consideration. If we do not comply with this condition, the walls must be suitably cribbed.
- When digging underneath or nearby existing buildings or important roads or paths and train tracks, they must be suitably shored.

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- When ditches are opened on pavements and traffic areas, an attempt must be made to create passageways for people, which must be sufficiently wide so as to prevent the falling hazards.
- When creating ditches to lay cables we must always leave a passageway between the edge of the ditch and the pile of earth removed when creating the ditch.
- Only containers intended for heating and melting insulating materials must be used when melting such materials to fill boxes, terminals and spliced cables.
- Containers used to heat and fill boxes, terminals and spliced cables must not be filled to more than 2/3 of their capacity.
- New insulating material must not be added to the container before it is removed from the flame. Add the insulating material in small pieces in order to prevent flying particles.
- For these jobs, as well as handling cable, the use of suitable gloves is mandatory.

4. ELECTROMECHANICAL ASSEMBLY OF THE SUBSTATION

4.1 GENERAL HAZARDS

In this section we analyze the foreseeable hazards inherent to the planned jobs, as well as those stemming from the use of machinery, auxiliary resources and tools.

4.2 SPECIFIC RISKS AND PREVENTIVE MEASURES

The risks specific to each of the main activities and the work stages are detailed, as well as the preventive measures to be adopted for each of them in order to prevent or control possible consequences stemming from the performance of one of the activities.

4.2.1 GENERAL GROUNDING NETWORK.

The installation must be equipped with a lower grounding grid.

The grounding protections must also be connected to all normally de-energized metallic parts that may be energized due to breakdowns, accidents, surges due to atmospheric discharges or conductive voltages.

- The risks involved are:
 - Same-level falls
 - Different-level falls
 - Knocks, injuries, etc. when handling cables and rods

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Preventive measures to be applied:

Special attention must be paid in the work area, ensuring that there are no materials or waste that people may trip over.

- Protective equipment to be used:
 - Safety helmet to protect against knocks and bumps
 - Safety goggles protecting against flying particles
 - Work gloves
 - Steel-capped safety boots
 - Protective clothing for bad weather

4.2.2 ASSEMBLY OF METALLIC STRUCTURE AND SWITCH GEAR

To implement and execute the installation, we must assemble a metallic structure that will support the installation and the busbars, as well as the electrical line fittings.

These structures are completed with lock fittings and auxiliary nuts and bolts to secure them to the distribution boxes, cable clamps and other required elements.

Such assembly must be performed primarily with lifting platforms and ladders.

- The risks involved are:
 - Different-level falls.
 - Objects falling during handling.
 - Becoming trapped when handling materials.
 - Cuts.
- Preventive measures to be applied:
 - While the work is carried out, the worker must remain inside the lifting platform's bucket and must be secured to it via the safety harness' auxiliary lanyard at all times.
 - Before using ladders, we must ensure they are in perfect condition, and not use those that do not provide safety guarantees.
 - All ladders must be equipped with non-slip feet.
 - Basic ladders must form, wherever possible, a 75° angle with the ground.

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- When using a ladder, the worker must not attempt to reach far away areas that force them to stretch, with the consequent risk of falling. The ladder must be moved as many times as necessary.
- The following protective equipment must be used:
 - Safety helmet with chin straps to protect against knocks and bumps
 - Work gloves
 - Safety boots with non-slip soles and reinforced toe caps
 - Tool bags
 - Anti-fall harness.
 - 1.5 m auxiliary rope with hook.

4.2.3 ASSEMBLY OF TRANSFORMERS

- The risks involved are:
 - Different-level falls.
 - Objects falling during handling.
 - Cuts, knocks, etc.

Preventive measures to be applied:

- To access the upper part of the transformer the following means must be used:
 - Ladders, scaffolding, which must comply with applicable safety regulations:
 - Before using ladders, we must ensure they are in perfect condition, and not use those that do not provide safety guarantees.
 - Using ladders or scaffolding to access heights exceeding 2 m must be accompanied by the use of a safety belt (anti-fall harness) or railings that prevents falls.
 - All ladders must be equipped with non-slip feet.
 - Basic ladders must form, wherever possible, a 75° angle with the ground.
 - When using a ladder, the worker must not attempt to reach far away areas that force them to stretch, with the consequent risk of falling. The ladder must be moved as many times as necessary.
- When performing work on scaffolding, we must check:
 - The surface the scaffolding rests on: resistance, leveling
 - Work platform: resistance, anchoring, width (60 cm), baseboard and railing (at 45 and 90 cm) around all the perimeter if it is more than 2 m high.

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- When working on platforms, workers must wear a safety belt and use it if the platform's railings do not prevent them from possibly falling.
- The following protective equipment must be used:
 - Safety helmet with chin straps to protect against knocks and bumps
 - Work gloves
 - Safety boots with non-slip soles and reinforced toe caps
 - Tool bags
 - Anti-fall harness.
 - 1.5 m auxiliary rope with hook.

4.2.4 INSTALLATION OF CONTROL PANELS, STRINGING AND CABLING.

- The risks involved are:
 - Falling at the same level
 - Staff falls at ground level.
 - Objects falling during handling.
 - Cuts.
 - Knocks from objects or tools.
 - Becoming trapped
- Preventive measures to be applied:
 - Pay attention in the work area and its surroundings.
 - The equipment, devices and tools must be suitable for the work that is to be carried out, kept in perfect condition and only be used for the purpose for which they are intended.
- When performing this task requires using a ladder, the following preventive measures must be adopted:
 - Only use ladders in good condition, with all their steps, feet on the legs, etc.
 - Place the ladder in a stable position (forming an angle of approximately 75° with the ground).
 - Always climb up facing the ladder, and only one person at a time.
 - When preparing the cable ends for connection to the terminal, do not position hands in front of the knife or stripping pliers' path.
- The following protective equipment must be used:
 - Safety helmet with chin straps to protect against knocks and bumps
 - Work gloves
 - Safety boots with non-slip soles and reinforced toe caps
 - Safety harnesses are mandatory when performing work at heights exceeding 2 m.

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4.2.5 TRIALS AND FINAL TESTS

The risks involved are:

- Different-level falls.
 - Objects falling during handling.
 - Cuts, knocks, etc.
 - Electrical risk
-
- Preventive measures to be applied:
 - The work area must be signed and demarcated with red and white tape.
 - Before the tests are started, all operators and workers, both from Vestas and other companies involved in the task, must be notified that the tests are about to start, stating that they must remain outside of the work area whilst the tests are performed.
 - Keep the safety distances at all times.
 - Comply with that established in the “five golden rules”.
-
- The following protective equipment must be used:
 - Safety helmet
 - Work gloves
 - High and low-voltage dielectric gloves
 - Safety goggles or protective facial screen against electrical arc.
 - Safety boots
 - Anti-fall harness and auxiliary equipment.

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5. MEDIUM-VOLTAGE AERIAL POWER LINES

5.1. REINFORCING AND HOISTING OF THE SUPPORTS

During this phase, the parts are joined together (bars and brackets) using bolts, the entire tower must be assembled on the ground to then be hoisted.



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5.1.1 REINFORCING THE SUPPORTS

Aside from the risks stemming from high-rise work, the following specific hazards exist:

- Falls at the same or at a different level.
- Objects falling due to subsidence or collapse.
- Direct and indirect electric contact.
- Cuts from tools, machinery and cables.
- Sprains caused by stepping on objects.
- Projection of pieces or particles.
- Objects falling during handling.
- Knocks– cuts from objects or tools.
- Knocks and/or bumps against the support, mobile objects (hook-crane)
- Becoming trapped by tools, machinery.
- Machinery overturning.

PREVENTIVE MEASURES

STORAGE OF THE STRUCTURE

- The structure from the suppliers must be stored in a stable location, from where
- the parts will be sent to each work area.
- The structure transported to the site from the warehouse and must be unloaded mechanically.
- It must be stored in an area neighboring the foundation so that it does not affect the other work and the traffic roads.
- The assembly area shall be an area with sufficient space in order to facilitate its subsequent mechanical hoisting.

ASSEMBLY OF THE STRUCTURE

During this phase, the parts are joined together (bars and brackets) using bolts, the entire tower must be assembled on the ground to then be hoisted

First phase. Preparation of the profiles and assembly the panels.

- The weight of the panels, assembled on the ground, must not exceed the estimated weight that the auxiliary crane can hoist in normal conditions.

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- The sorted profiles must be located in the area chosen for them to be assembled, so that this area does not interfere with the movement of staff.

Second phase. Assembly of the tower on the ground.

- The wedges or shims must be of appropriate resistance, shape and positioned correctly in order to guarantee the support is perfectly stable.
- Since assembling the tower on the ground reaches considerable heights in the base area, the workers must have access to ladders in order to facilitate their access to the tower.
- Workers must not move on the assembled profiles of the upper side of the tower; they must always travel on the ground.

5.1.2 HOISTING OF THE SUPPORTS USING A CRANE TRUCK | BOOM TRUCK

Aside from the hazards stemming from high-rise work, the following specific risks exist:

- Falls at the same or at a different level.
- Objects falling due to subsidence or collapse.
- Hoisted items falling on staff.
- Direct or indirect electric contact.
- Injuries from handling machinery.
- Cuts from tools, machinery and cables.
- Sprains caused by stepping on objects.
- Objects falling during handling.
- Knocks– cuts from objects or tools.
- Machinery overturning.
- Knocks and/or bumps against the support, mobile objects (hook-crane)
- Becoming trapped by tools, machinery, conductors.

PREVENTIVE MEASURES

- Demarcate the work area and include road signs.
- Check and appropriately check the protective equipment.
- **Follow the "high-rise work" precautions**

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HOISTING USING CRANE TRUCK - BOOM TRUCK

- Stabilize the crane truck.
- Do not exceed the maximum permitted load for the crane.
- Sling the hoisted item above its center of gravity.
- Workers must not be stationed below suspended loads. When transported items cannot be prevented from swinging, guide them to their position using ropes from a safe place.
- Do not transport workers under loads or via hooks or empty slings.
- When the hook is not carrying a load, perform movements with the hook raised.
- Do not ever leave hoisting equipment with suspended loads.
- Raise and lower the load vertically. If it is not possible, the Foreman must lead and take charge of the operation.
- Revise cables, ropes and chains.
- Do not use various pieces of equipment to raise the same load. If it is completely necessary, the Foreman will be responsible for leading the operation and adopting the appropriate measures.
- Ground the support when it is in a vertical position, and hang the danger warning sign.
- Adopt the following measures if working close to energized electrical lines:
 - Keep a safe distance that must at least 5 m.
 - Ground the truck-crane.
 - If such distances cannot be guaranteed, use sufficiently resistance protective screens.
 - Do not touch the support until it is in a vertical position and has been grounded.
 - If the crane comes into contact with the energized electric line, the crane operator must remain in the cabin until the line has been taken offline. If the cabin must be abandoned, do not create a bridge between the vehicle box and the ground, jumping as far as possible and then making small jumps with your feet together.

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5.1.3 RECTIFICATION AND CENTERING WORK

Aside from the hazards stemming from high-rise work, the following specific risks exist:

- Falls at the same or at a different level.
- Objects falling due to subsidence or collapse.
- Hoisted items falling on staff.
- Direct and indirect electric contact.
- Cuts from tools, machinery and cables.
- Sprains caused by stepping on objects.
- Objects falling during handling.
- Knocks– cuts from objects or tools.
- Knocks and/or bumps against the support, mobile objects.
- Becoming trapped.

PREVENTIVE MEASURES

- Possibly one of the most dangerous work phases since it combines short activities with various movements, which creates a logical tendency of not continuously using the anchoring measures.
- Use of the SAFETY LINE is mandatory, one section per worker.
- Workers must be attached at all times to a guide rope with a non-slip anti-fall device, which shall be organized based on the number of workers that have to participate in the area simultaneously.
- No safety system other than a safety line with a rope per worker must be used for this type of work.
- When the workers move they must carry the tool in their tool bag.

5.2 STRINGING OF CONDUCTORS

5.2.1 STRINGING THE CABLES

Stringing the cables involves placing them along the electric line, passing them through the pulleys located in the supports, which are positioned at the height of the cables' joint. A "Winch and brake" is required for this operation.

WINCH

The winch will be used to pull the cables by means of auxiliary pilot cables and will be powered by an independent engine. The nameplate will display its tractive force. It will be equipped with an automatic braking device and pull gauge. It must comply with that set forth in the [CE marking](#)

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or the corresponding legislation in force. A visual inspection must be performed before work starts to detect possible defects.

BRAKE

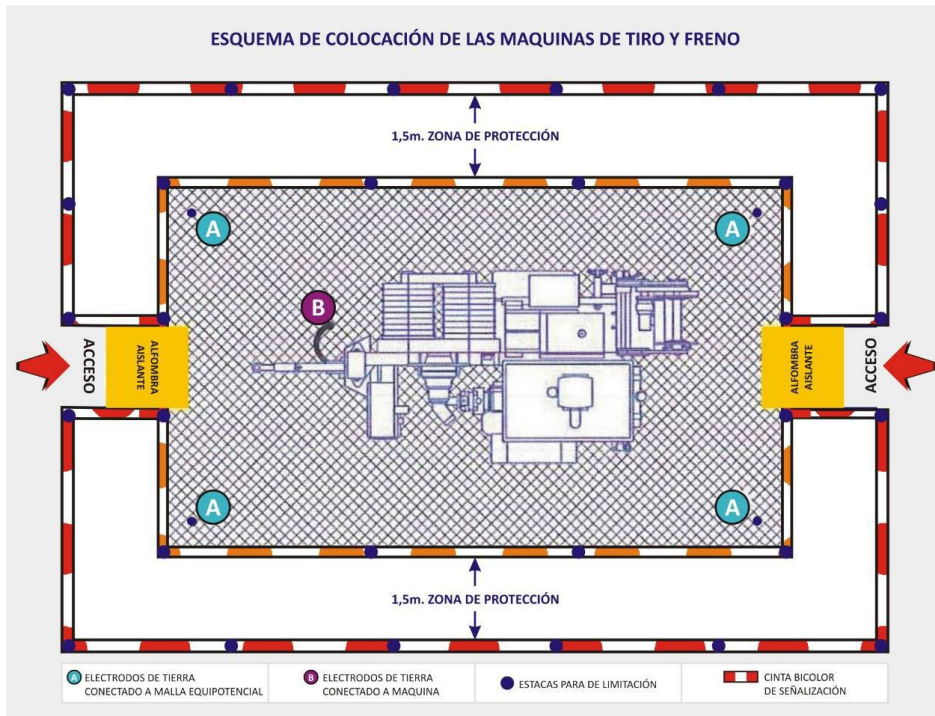
When the cable exits the coil it, must be fed through the brake, which maintains it at the sufficient mechanical

tension so that it prevents the objects on the ground from being damaged. It must be equipped with a dynamometer. It must comply with that set forth in the CE marking or the corresponding legislation in force. A visual inspection must be performed before work starts to detect possible defects.

5.2.2. GENERAL PREVENTION MEASURES

- Both the winch and brake must be securely anchored so that they can't move or be moved even in the worst operating conditions.
- Both machines must be grounded in order to prevent possible electrical discharges on the conductors that are being strung together.
- The winch and brake must be positioned on an equipotent grid that is grounded at all four ends and attached to the machinery itself via copper straps. The grid must have a demarcated perimeter of at least a 1.5 m with insulating carpets in the access paths to the area, with the aim of protecting the authorized workers performing the stringing operations from possible electrical discharges.
- We must check that the cables slide smoothly on the pulleys at all times.
- During the stringing process, the necessary number of workers equipped with telephones must be located at all points where damage may occur to the conductor in order to stop the work immediately.
- The telephones must be checked prior to the stringing operations commencing.
- Moving the stringing equipment and coils must take place on solid ground and away from openings.
- The cable will be removed from the coil by rotating the coil. The coil must be turned in the opposite direction to that indicated by the manufacturer and indicated on the coils themselves.
- The jacks holding the coils must be equipped with brakes in order to prevent more cable than that required exiting through the brake spools.

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5.2.3 BRAKE – WINCH

PREVENTIVE MEASURES

- Only staff authorized by the company and with sufficient training may use the stringing machinery (Winch - brake).
- Those responsible for handling the coil and winch must always be in communication with the person in charge of the operation.
- During the stringing operation, staff must be located at a sufficient distance so that, in the case of any unforeseen movement, they cannot be caught by the cable.
- When the cable is moving and the conductor's pilot cable exits the guides/and or pulleys, no attempt shall be made to replace it; instead the person responsible shall be informed and the machines must be stopped in order to feed the cable once again.
- The work area must be kept free of obstacles, stones and other objects.
- The use of safety helmets, gloves and boots is mandatory.

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COMMUNICATION BETWEEN STAFF

Before starting the operation, ensure all operators performing the stringing are in contact via radio or telephone with good reception from their command points and especially with the following staff:

- Worker responsible for the BRAKE
- Worker responsible for the PULLING WINCH.

PULLING THE CABLE

When the cable is laid, it must be attached to the end of the winch by means of a pulling head in order to keep the end under control.

Correcting the cable during the pulling operation is entirely

prohibited. When performing tasks at the aforementioned point, they must be performed when the winch is not working and led by the person responsible for the stringing, who must be in constant communication with the person responsible for the winch.

During the stringing operation, special attention must be paid to the proximity to live electrical lines; the worker responsible for the pulling winch must be protected from indirect electric contact hazards by means of the measures that are deemed most appropriate (discharging nearby electrical lines, grounding the winch, placing screen on the pulling cable, etc.). In any case, the developer's, substation boss', safety coordinator's or the on-site safety manager's instructions must be followed.

5.2.4 POSITIONING OF EQUIPMENT, CYLINDERS AND CABLE JACKS

The following preventive measures must be taken into consideration during this task:

PREVENTIVE MEASURES

- The preventive measures set out in the loading and unloading section must be adopted.
- The coil unloading and positioning instructions are intended for one person only.
- The crane operator shall pay attention to both the suspended load and the instructions they receive.
- When unloading the cable, protective gloves and safety helmets and shoes must be worn.
- The coil jacks must be suitable for the weight and volume thereof.
- The base must be suitable for the coil that is to be handled.
- The ground where it is stored must be firm and obstacle-free.

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5.2.5 CHECKING THE PULL

The following preventive measures must be taken into consideration during this task:

PREVENTIVE MEASURES

- The stringing machinery (winch – brake) must be positioned on firm and stable ground. Traction tests must be performed on the ground to check the stability thereof.
- The machinery must comply with the regulations in force. It must be equipped with an emergency stop.
- The winch must be equipped with the relevant grounding systems in order to prevent possible electrical discharges.
- The worker responsible for the pulling winch must be located out of areas where cables are likely to break.
- In areas where machinery is operational, the danger area must be demarcated based on the movement of the pulling cable.
- We must check that the safety cable coil is securely positioned and that the number of turns thereof are consecutively rolled in order to prevent irregularities when the cable is pulled. Before work starts, we must check that both the cable and its pitch are correct.

5.2.6 ANCHORING WITH CABLE-STAYS – CONCRETE RESTS.

In this case the tower is the last one of the section and one side has the cables and on the other the anchors (guys). We could say that the support is compensated, therefore we can fasten the cables (to one side).

- After fastening the following series of cables on the other side, we can see that the horizontally tensioned cables are compensated but the vertically tensioned cables are duplicated (we must add the regular cable component plus the tensing cable from the traction heads to the cables vertical component). Therefore, the crosspieces must be hauled tight vertically.
- The tension of the crosspiece's strap must be calculated for the weight of the overhead line. Once the second side has been adjusted, as soon as we can retain the cables at the crosspiece's point, the guys can be removed.
- Workers must not be attached to the strap but the cross point. If a strap breaks, the point at which it is secured will be stable, even if the cross piece is deformed.
- For elevated loads (4,000-5,000 kg.) we do not recommend attaching the entire load to the hooks; however, keeping a guy at the height of the hook with 50% of the load is preferable.
- Using cranes with sufficient countershaft is advised so that normal pulleys can be used when lowering these loads back to the ground.

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- The resulting forces of the operations must be taken into account when choosing appropriate pulleys.

5.2.7 USE OF A BUCKET TRUCK

The following preventive measures must be taken into consideration during this task:

- Different-level falls
 - Equipment overturning
 - Materials falling on people and/or goods
 - Workers being knocked or becoming trapped or the platform / bucket against fixed or mobile objects.
 - Direct or indirect electric contract
 - Same-level falls
 - Becoming trapped between some mobile parts of the structure and between the structure and the chassis.
- Regulations to adopt prior to the start-up of the platform/ bucket
 - Before using the equipment it must be inspected in order to detect possible defects or faults that may affect its safety. The inspection must include the following:
 - Visual inspection of deteriorated soldering and other structural defects, hydraulic circuit leaks, damage to various cables, condition of electrical connections, condition of tyres, brakes and batteries, etc.
 - Check the operating controls are working properly.
 - Any defect must be assessed by qualified staff and determine if it constitutes a risk to the team's safety.
 - All defects found that may affect safety must be corrected before the equipment is used.
 - Regulations to adopt prior to the start-up of the platform/ bucket
 - Check for possible HV electrical cables. in the equipment's vertical line. We must keep a safe distance from them, insulate them or cut the current while the work takes place in the area.
 - Check the condition and leveling of the surface of the equipment's support.
 - Check that the total weight placed on the work platform does not exceed the maximum operating load.

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- If stabilizers are used, we must check that they have been positioned in compliance with the manufacturer's regulations and that the stabilizers cannot be activated when the platform is not in the transportation position or at its position limits.
 - Check the condition of the platform / bucket protectors and the access door.
 - Check that the safety belts of those working on the platform / bucket are appropriately fastened.
 - Demarcate the work area in order to prevent those not involved in the work remaining or moving around the nearby area.
- Regulations for moving equipment when the platform / bucket is raised
 - Check that there are no obstacles in the direction that the equipment is to move in and that the supporting surface is resistant and level.
 - Keep a safe distance from obstacles, rubble, unlevel ground, holes, ramps, etc. that compromise safety. The same must be done with obstacles located above the work platform.
 - The maximum speed at which the occupied platform travels must not exceed the limit established in the instructions.
 - The platform must not be raised or driven in adverse weather conditions.
 - Do not handle the equipment distractedly or recklessly.
- Other regulations
 - Do not overload the work platform.
 - Do not use the equipment as a crane.
 - Do not secure the platform or the worker on the platform to fixed structures.
 - Adding items, for example advertisement panels, that may increase the platform's wind load is prohibited, as the maximum operating load, structural load, wind load or manual force may be affected, depending on the context.
 - Workers must keep both feet on the platform when working on it. They must also use safety belts or harnesses that are appropriately secured.
 - Auxiliary items located on the platform must not be used to gain extra height.
 - Any anomaly detected by the worker that affects their or the team's safety must be reported immediately and repaired before work is resumed.
 - Altering, modifying or disconnecting the team's safety equipment is prohibited.
 - Do not climb or drop down from the platform / basket if it is raised using the lifting device or any other access system.

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- Regulations for after the use of the platform / bucket
 - Park the machine in an appropriate position when work is completed.
 - Turn off all the switches and check it is immobile, locking the wheels if necessary.
 - Clean the platform of grease, oils, etc., that have spilled on the platform when the work was carried out. Take care when using water so as to not affect the equipment's cables or electrical parts.

5.3 INTERSECTIONS

5.3.1 INTERSECTIONS

The data described below (Intersection of LAAT (high voltage aerial electric lines, roads, rivers, ravines, paths, train tracks) are generic and are likely to change since the Procedures described are authorized by the various competent control bodies.

The following preventive measures must be taken into consideration during this task:

- Falls at the same or at a different level.
- Objects falling from the post or protective equipment during assembly.
- Crossbeams used in the protective equipment falling.
- Falls from the bucket due to an abrupt movement or excess load.
- Objects falling during handling.
- Damage to the bucket due to overloading when using it as protection for feeding cable.
- Objects falling due to subsidence or collapse.
- Crashes and collisions with vehicles.
- Direct and indirect electric contact.
- Becoming trapped when posts used in protective devices fall or break.
- Stepping on objects.
- Knocks– cuts from objects or tools
- The crane overturning due to poor leveling, unstable ground where the crane is positioned or excess load.
- Broken straps, guides, etc.
- Cuts, scratches, etc., on cable protectors.
- Injuries to third parties when stringing conductors on natural elements or the pre-existing road infrastructure.

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PREVENTIVE MEASURES

- The ditches, pits and/or openings to be used for the protective posts must be appropriately demarcated.
- The posts must be checked before they are used as a means of protection.
- The post must be correctly and effectively embedded in the ground, ensuring it is suitably anchored to the ground based on the height of the post and the ground.
- Climbing the protective structure must be avoided; therefore an attempt must be made to assemble the protective structure on the ground for it then to be hoisted. If climbing the post, we must first check carry out a check on it and the worker must use a safety harness attached to a life line and suitable gaffs.
- When accessing the post, tools must be carried in the tool bag or securely fastened to the safety harness.
- The contents of this safety plan must be adhered to when performing high-rise work and work performed near to energized elements.
- When work is performed in areas with moving vehicles, the work area must be suitably demarcated, avoiding, where possible, positioning oneself close to traffic. Furthermore, all instructions stipulated by the bodies affected by the intersection must be adhered to.
- When using the crane bucket as protection, wear the harness and attach it from the dorsal or abdominal anchoring.
to a secure anchoring point that is not part of the bucket by means of an absorber.
- The crane must be locked while work is underway, with the stabilizers, positioned at their maximum distance, resting on level and dense ground. If the ground is not sufficiently dense,
- spread the load across each stabilizer using railway sleepers or planks that are at least 8 cm thick lying across each other in an orderly fashion; when using planks each layer must rest on the previous layer.
- The bucket operator must be aided by a member of staff with sufficient training.
- There should be no obstacles or hazards for the lowering of the cage underneath the cage's working area.
- Maintain a distance greater than 5 meters from energized electric cables. Do not overload the cage or push it sideways. Even when a door-opening is protected by various cages, each cage (and the crane) must be able to support the weight of the operator(s) working in it plus the weight of the cable hanging along the entirety door-opening.

HEALTH AND SAFETY PLAN BOP

Mod. II Assembly and Installation of Wind Turbines V80/90

**WIND FARM ENERGÍA EÓLICA DEL SUR- POLÍGONO
JUCHITÁN**

IN JUCHITÁN DE ZARAGOZA, OAXACA, MÉXICO.



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1. LOADING AND UNLOADING MATERIAL

- Loading and unloading foundation sections

The foundation sections must be loaded and unloaded with an auxiliary crane, using lifting tools approved by VESTAS. This may be performed over the bottom or lateral flange. It is advisable to place the foundation section over the lower flange, since this method facilitates later unloading. If they are loaded over the lower flanges, they can be put down two by two in the trailer.

- Loading and unloading towers

The towers can be loaded and unloaded from the trailer with two auxiliary cranes, anchoring each of them to each end of the tower using VESTAS approved lifting tools in order to hoist them (J-Hook). These tools should be previously adjusted to the flange's width and they should only be placed using the crane, eliminating the need for personnel to handle them. The personnel shall only guide the crane operator for correct placement, and if necessary, guiding ropes can be used to guide the tool as effectively as possible, while avoiding going on to the lorry or bearing structure.



- Loading and unloading the Nacelle



The system of loading and unloading of nacelles has been replaced by the new exhaust system with base plate. Loading and unloading of the nacelle is carried out by truck own hydraulic system. Downloading the

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nacelles with the new transport system implies the need to put supports under the baseplate of the nacelle. The placement of this support is defined in the instruction of transport 0002-1293, with the option of supporting the nacelle on the ground under the baseplate placing support beams (item 10100503) batts (10102066) or hardwood beams. (Comment also have the option to download using hydraulic supports for legs, Jacking System, which are placed on the baseplate. Use of Jacking System is defined in the WKI 0004-172)

Will have six beams of dimensions 20x20 cm and a length of 4 m. These beams are placed transversely to the baseplate in two groups of three in the ends of the baseplate. On each group of three beams are placed blocks 20x30x60 cm, divided into two groups of three, and these are placed on sheets of plywood 60x60x2 cm.

The placement of the cross beams, due to its weight and volume, can generate a risk of excessive effort, which is eliminated by placing them making use of the telescopic handler.

They placed fiber tacos like the picture, the function of these blocks is simply to ensure that in case of failure in the hydraulic system of the truck's load does not come down and be retained by the blocks in question. It is for this reason that prior to placing wooden blocks under the base plate should be placed fiber plugs as a precaution.

Freed from nacelle transport equipment.

Once the previous step will proceed to the nacelle posing in bed prepared with the beams and studs, lowering the suspension of transport equipment.



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We will remove the beams on which rested the nacelle in transit. The retired pulling ahead with the tractor, for that the subcontractor for such operations must remove the rear carriage of the beams to pull them with the handle we have in the park or your own tractor will pull the rear carriage to separate the assembly.



After removal of beams, depending on space, the outsourcing company must decide how to re-engage the team, if only between cars and charging up the two beams with a crane or the whole team stretched.

- Retired from Nootboom transport equipment behind.

After completing the above steps will proceed to remove the beams on which rested the nacelle in transit. Withdraw the beams behind them pulling with the tractor and for that the subcontractor shall remove the front car with the truck pulling. Once released the truck tractor front + team, we will remove the beams pulling all the remaining equipment to the tractor, since we can not put the wheels that bring the manufacturer to remove the beams, studs will place cross and go supplementing until the beam is completely released from the nacelle.



Remove the side beams pulling them with the telescopic handler. Will post 2 beams cross and liberate both the front and rear car.

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After removing trolleys pass a sling through the two holes used to remove beam manipulator and will throw more than 5000kg the beam until we save the nacelle. Then we will raise the beam through the lifting points of the same and placed in on the transportation.

Unlike other models, the nacelle of the V80/90 is discharged directly via crane, so same tools will be used to the lifting of it. Will be discussed later.

Bad practices:

Download of the nacelle;

It is forbidden to stay right next to the nacelle while you are doing the unloading and positioning it on the wooden blocks. Before downloading the nacelle will take the appropriate steps to ensure that the wood blocks are in the right place. No one needs to be as close to the nacelle as you can see in the picture below.



Lifting tool for the nacelle; The reception of the sling should be done "ALWAYS" with the body partially introduced into the nacelle. If possible you would use a guide rope tied to the sling to minimize exposure time outside the nacelle.



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- Loading and unloading the hub

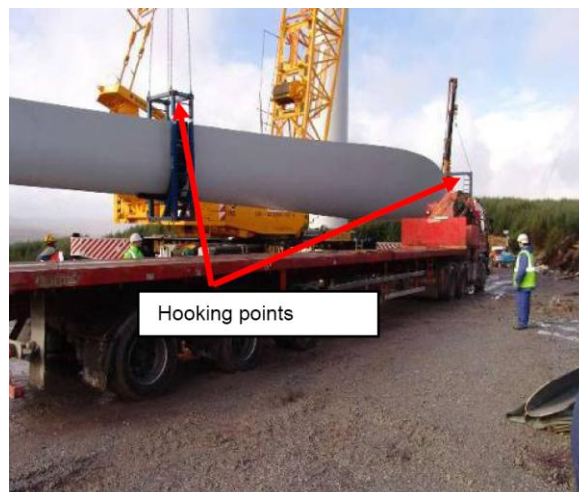
The hub must be loaded and unloaded with the auxiliary crane, which will be connected to the anchor points on its upper section which were created for this express purpose.



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- Loading and unloading blades

Two auxiliary cranes must be used to load and unload the rotor blades, which will be anchored with a hook, using a VESTAS approved lifting tool, to the anchor points on the mounting that are designed for their transportation.



- Loading and unloading the other materials

Materials like secondary components, tools, wiring, etc. shall be loaded and unloaded manually, when the cargos' weight is appropriate. When it cannot be done manually, it shall be carried out with mechanical resources, like auxiliary cranes, or with the lorry, if self-loading lorries are being used for transportation, or using the telescopic manipulator available at the site, with the appropriate tool. This material shall be perfectly palletized for safe unloading, in order to prevent it from detaching or falling, as well as for stable storage.

A visual check of the lifting equipment should be performed before its use, in compliance with VESTA MED INS 31.01.01 internal instructions to verify that there is no visible deterioration which may have taken place during use between its periodic inspections, confirming this by completing the corresponding forms for each element. Likewise, the crane leasing company shall guarantee the suitability and good working condition of the cranes, providing documents which corroborate corresponding inspections, as well as the qualifications of the operators who drive the cranes.

2. PREPARATION FOR THE INSTALLATION OF THE WIND TURBINE'S MAIN COMPONENTS

Distribution on the site: Thoroughly plan with the crane supplier the dimensions of the grounds, the position of the crane on these grounds and the storage of the wind turbine components in relation to the concrete foundation to guarantee safety and efficiency while working on-site.

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In general, the Mounting Platforms of V80/V112 turbines, whose typical shaft heights are between 80 and 105 m, must meet the requisites established in VESTAS' "Technical specifications of roads, mounting platforms and activities for the displacement of the lattice crane", included in the appendix.

Transports with significant tonnage, cranes, or storage of principal components, may not enter without previously verifying that the resistance values of the terrain are appropriate, confirming this resistance with tests performed on platforms and roads.

While distributing stored material as well as cranes and vehicles, it must be remembered that no main roads may be blocked, which would interrupt emergency evacuation due to the possible emergency situations detailed in the project's Emergency Plan.

It must be confirmed that there are no interferences in the crane's work area, like electrical aerial wiring, buildings, etc. and preventative measures must be taken in accordance with point 1.3 of this plan.

Likewise, it must be confirmed that there is no uneven land or obstacles in the terrain which can affect foot or vehicular traffic which may take place due to the concurrence of activities with civil work. If these obstacles are present, their fitting-out, protection or marking off must be requested, in accordance with the risk generated by the installation which is to be carried out.

Foundation: The Installation Supervisor must confirm, with the Project Director, that the values of the tests performed on the cement used for the foundations are appropriate and in accordance with the related foundation project.

Climatological conditions: Safety is greatly affected by different climatological conditions which arise both when assembling the main components, and once the turbine is installed, while working in the interior. Hence, the following restrictions must be considered:

- The maximum wind speeds during installation activities are the following (amounts correspond to a ten minute average).

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Operation	Wind speed limits (m/s)
Unloading material and storage with cranes	16
Mounting lifting equipment (CRANE)	16
Mounting tower sections	12
Mounting nacelle	10
Installing blade hub (with nacelle on the ground)	16
Installing blade hub (on installed nacelle)	10
Individual horizontal installation of rotor blades	10
Work inside the blade hub	11
Work inside the nacelle	20
Work inside the tower	25
Work with lifting platforms	12
Lifting material with the service crane	15

- The supervisor must bear in mind the risk that gusts of winds may cause during installation.
- If the installation supervisor believes these operations are unsafe, or if the personnel involved do not feel comfortable with the safe execution of work under the existing climatological conditions, the work shall be postponed, because safety always takes top priority.
- In the event of fog, there must be 100 metre visibility in all directions.
- On days which are extremely cold, the possibility of snow and ice accumulating on the installed turbines must be considered, due to the risk associated with ice coming loose and falling on personnel. As it is the supervisor who manages this, through FR 027 Identification of hazards due to ice and snow.
- Work will also be suspended in the event of rain, or flooding of the work area, which would result in a risk to the workers' health and safety due to falls or the movement of vehicles. In the event of an electrical storm, all work must be stopped, and may not be resumed until one hour after the end of the storm. These restrictions will be valid as long as there are no other, more restrictive limitations from the technical specifications of the auxiliary resources being used, like lifting equipment or lifting platforms. In this case, adhere to the auxiliary equipment's restrictions.
- To prevent working conditions from changing rapidly during an operation, exceeding the wind speed limits, and circumstances created by other conditions like those which were previously described, it is extremely important to check the weather forecast every day.

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Lighting: Work shall be performed during the day. Under very specific conditions, when, due to the reduced day light hours during the winter there is not enough time to mount different components under normal conditions, or due to the irreparable need to install a component to ensure the stability of the structure, caused because installation was delayed until dusk, the work may be continued. Work can continue as long as the lack of natural light is compensated for with the installation of artificial light panels, until the levels of acceptable illumination are reached to prevent risks to the health and safety of the workers when performing different installation activities under these conditions. In this case, follow the Annex called Artificial illumination that takes the same name as WKI 218.

3.SIGNALING AND FENCING

Signposting: The entrance to each of the platforms where work is carried out must be marked with beacons; signs prohibiting entry must be used to keep unauthorised individuals or those not involved in the work away from these platforms. Likewise, signs indicating risks and necessary personal protection equipment will be posted in the work area.

The signage must have the following symbols, at a minimum.



Platforms:

The platforms will be fenced by New Jerseys perimeter with reflective elements on all sides with slopes , ie risks of falling when are doing work with any type of mobile computer. Therefore, it is not necessary to

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dispose of New Jerseys for all platforms, can be moved from one to another according to job scheduling. If this type of fencing are impossible to find, another alternative of beaconing used to prevent or minimize physical risk of fall at different levels. Example: guardrails, mesh type stopper(orange) properly placed and maintained, etc.

It will not be enough to place warning type.

- During operations where main components are being mounted, access roads must be blocked as follows:
 1. For erecting of T1 and T2: Maximum height of crane for lifting the "T" section, plus 30 mts.
 2. For erecting of T3, T4, (T4 only I/A) Nacelle, blades and hub (if mounted above) they shall refer the hub height plus 40 mts.
 3. Both for point 1 to 2, will be measured from the base of the turbine.
 4. All vehicles remain off the platform, putting knowledge early enough this fact, necessary for coordination of activities with other companies that take part in the work, as well as adjoining land owners. The same is done with staff not involved in the maneuver, ie, within the perimeter only minimum staff for installation will be inside of it. All other personnel should be outside the perimeter without exception before start the lifting . Vestas supervisor and / or the subcontractor for installation will be responsible of these points.



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If visitors enter the work area, authorised personnel must accompany them. This shall be carried out in accordance with the internal procedure for visits, BP MED BP 04.05.00 "Visitors at the wind farms", if the visit was scheduled by VESTAS or any of its subcontractors.

As previously mentioned, personnel must request the elimination, protection and/or posting of signs on uneven land created by other businesses taking part in the work, because they can interfere with the movement of people and machinery.

4. MATERIAL STORAGE

In accordance with the nature of construction work on wind farms, the majority of the materials are stored at the building site before their use, and in some cases, to prevent their absence from causing delays in work. Likewise, in some cases due to the impossibility of their "just in time" application, that is, at the rate they are received, and by the possible delays produced in the project, or for inappropriate conditions at that time, the storage place must be as close as possible to the location where they will be used.

To guarantee the stability of different stored materials they must be placed upon resistant surfaces (the DEVELOPER will be asked to provide information on the terrain's resistance in the storage area to confirm that it meets VESTAS' requirements in the "Technical Specifications of Roads, Mounting Platforms and Activities for the displacement of the Lattice Crane" before placement) which are stable, and as horizontal as possible. If the ground conditions are deficient, storage can be requested until the previously mentioned specifications are met.

The main components, like the nacelle, hub and rotor blades will have frames or stands which will prevent them from overturning once they are placed on the ground. The tower sections shall be supported on sleeper wood so that the tube is completely immobilised (see image).



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Hence, it is very important to define, before the materials arrive, specific and convenient storage locations so they can be deposited in accordance with their characteristics (dimensions, shape, weight, etc.), and the specifics of the work and constructive process.

If the components will be stored on site for several days, they must be protected from meteorological inclemency (shackling and optimum aerodynamic positioning to prevent overturning, damage, etc.).

5. PREPARATION AND MOUNTING OF THE TUBULAR TOWER

The most relevant tasks which may affect the health and safety of the workers are listed below:

Preparing the sections and foundation



- First, the tower must be inspected to confirm that there is no surface damage or irregularities in the flange.
- Subsequently, the flanges in all of the tower sections and foundation must be cleaned, and a file should be used to eliminate any chips or scratches.
- When storing the tubes, both ends must rest on wooden supports protected with pieces of fabric or a similar substance to prevent scratches, and blocks are used to prevent movement.

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- Before installing the tower sections, the electrical cabinets must be placed on the cement foundation so they are inside of the bottom section of the tower when it makes contact with the foundation, as they do not fit through the tower door. First, the two control plates located on the



left side of the door (when facing the bottom section of the tower from the outside) must be removed.

- VESTAS approved mountings must be used to elevate the cabinets in this operation.

Mounting the tower sections

- Once the cabinets are fitted above the foundation, the tower sections can be hoisted. This activity should always be performed with the self-supporting crane to lift, and another auxiliary crane of lower capacity to hold the guy rope, both supplied by VESTAS subcontracted rental businesses. With the exception of the cranes, all lifting material will be VESTAS property (shackles, slings, hooks, etc.) and will be approved in order to perform the operation, in accordance with the installation manual, and its operational control will be ensured by an authorised individual.
- Despite all the controls, a designated employee from the company that is subcontracted for the mounting will perform a visual check before use to confirm that there is no visible deterioration which may have occurred when being used between periodic inspections, as established by the internal instructions **VESTAS MED INS 30.01.01**. Likewise, the crane leasing company shall guarantee their suitability and good working condition, providing documents which corroborate the corresponding inspections, as well as the qualifications of the operators who drive the cranes. With these control systems, it can be guaranteed that while mounting the sections – which require the presence of personnel under the suspended load and in its area, at precise, determined moments during the assembly – the risk of an object coming loose due to breakage in the hoisting equipment is reduced to tolerable levels.

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- Position the lifting brackets so they create a square with the same number of openings between each bracket on the top flange, and position the slings and shackles as described in the directions from the mounting instructions. The section must be on the ground to perform this operation. Never complete this step from the vehicle which is transporting the section, as it produces risks of falls from height (> 2m).



- In order to attach the guy rope on the lower flange, the placement must be carried out in the same way, with a VESTAS approved bracket (J-Hook). These tools should be previously adjusted to the flange's width and they should only be placed using the crane, eliminating the need for personnel to handle them. The personnel shall only guide the crane driver to ensure correct positioning. If appropriate, guiding ropes can be used to position the tool more effectively.



- Before lifting the tower sections complete all the cleaning and defect painting possible, and confirm

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that there are no unattached elements, ice or dirt within the interior that may fall during the hoisting process. Also apply a fine layer of sealing glue to the S40 seals on both sides of the flange, extending to around 10 mm from the exterior edge, except in the top flange of the topmost section.

- Once the tower section has been prepared, the guide pins must be positioned in the flange (they will be secured with adhesive or a similar tool to prevent them from coming loose during the lifting) and then the section may be lifted. When it has been lifted a metre and a half, the areas that were previously inaccessible may be painted or cleaned. This must be done with tools that allow the worker to keep a safe distance from the component, like power washers or telescopic handles of adequate length for the brushes, as no worker may stand under a suspended load. If it is impossible to complete the repairs or cleaning and still comply with the safety measures, then the process shall be completed once the turbine is mounted, using the lifting platform.



- Once the section has been mounted, the guy rope device will detach by itself when the auxiliary crane's voltage is reduced, personnel shall not to stand under the load to retrieve it.



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- When the first section is installed on the foundation, it must be confirmed that the cabinets installed within it and the door are correctly positioned. To do so, lower the section using the magnetised handles attached to the tube, or using the guiding ropes attached to the section's flange. It will be moved manually, from the exterior, so that the guide pins line up with the openings in the platform, so the section is in the desired position.



- Once the tube is supported, the service technicians may enter the tower section through its door and descend into the foundation to fix the section to the foundation, placing and torquing the bolts using an electric tool (Maquita). An approved portable ladder of appropriate size should be used for safe entry when accessing the door. In order to descend to the flange another portable ladder will be used. Under no condition may improvised, unapproved devices or other methods be used to reach the flange. Until the torque is completed, the elevating equipment cannot be removed. To do so, someone must ascend to the top flange in the tower to release the hoisting elements.
- Once the first section of the tube has been attached the original turbine ladder, which should have been previously assembled, will be installed for subsequent access to the tower.

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- The other sections must be positioned in the same way, ensuring the ladders are lined up, so they can later be joined with clamps, as well as the safety line connection, the crane driver should receive positioning instructions while displacing the component from the platform where the flange joint between two sections is located. To do so, and to prevent the personnel from becoming trapped, they must always avoid positioning themselves between the section and immobile objects, like the ladder, extremities should also not be placed between two sections during assembly. The bolts must be previously hoisted in a container, using the crane to prevent manual transportation.
- Those individuals who must ascend the tower to release the lifting equipment and those mounting the rest of the sections and components must make use of a fall arrest system during their ascent, this system will have a safety harness (EN 361), and sliding fall arrester with self-acting block for the AVANTI factory certified safety line (EN 353-1). In turn, there must always be an anchor cable with shock absorber (EN 355) to be fastened to a fixed point before detaching the safety line to access the platforms. Likewise, it will be used when changing the safety line from one section to other sections which have not been attached.
- In order to release the lifting equipment and avoid the risk of entrapment by releasing the two blocks, a sling must be used in order to shorten one of the two metal wires and thus get a difference in height between the two fixtures. In this way can eliminate the risk of entrapment and simultaneously prevent the fasteners from striking each other and can break.

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- Once the tower is assembled, and within the first 48 hours, or before leaving the wind turbine in Free Wind position, all bolts must be completely torqued. Begin by tightening all of them halfway using the hydraulic torque wrench, while taking care to not leave air gaps between the flanges inside of the tower. If air gaps appear, they must be eliminated. Once they are all tightened, the final torque may be completed, which is established in the manufacturer instructions. Mark each tightened bolt throughout the installation process to show that the installation process has been completed, avoiding errors and oversights which could cause serious mechanical errors or damage to individuals.

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- For the placement and tighten the remaining screws in the area of the elevator hole , we will use fall arrest system using with safety harness (EN 361) a retractable block and lanyard attached to the ladder as a fortune anchorage point in the side of the ladder



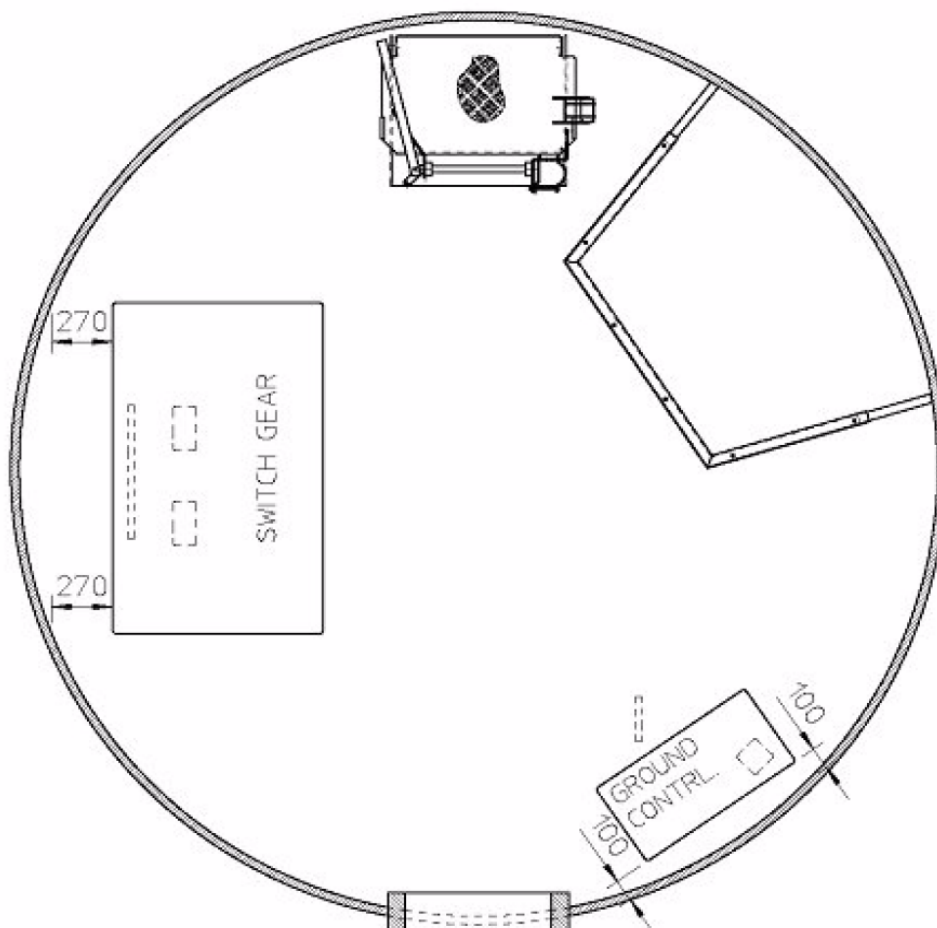
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Electrical installation

- If it is observed that the electrical installation in the different sections is not complete, it shall be carried out before hoisting.
- Once two sections are installed, the wiring fittings between the sections must be created, in order to raise voltage and light throughout the tower structure.
- All of this work will be voltage free, by disconnecting the power supply from the generator unit which may have been connected to the circuit.

Distribution of the tubular tower

- Before installing the controller and cells, the tower's bottom platform must be installed.



- To fit the controller, create the necessary holes in the platform to attach the controllers and HV cells. To avoid damaging the wires, the edges of these holes must be covered with rubber. Subsequently, they must be lifted to the platform using hoists attached to the beam that is located

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under its top platform for its correct distribution on the platform.

- Once they have been elevated and positioned, the positioning of the platform section shall be completed, ensuring complete closure to eliminate the risk of falling to a different level.

6. NACELLE PREPARATION;

The most relevant tasks which may affect the health and safety of the workers are listed below:

- Although the nacelle is positioned on the ground, it is more than 3 metres high; hence, in order to access the upper area, personnel must use a fall arrest system containing a complete harness (EN 361) and a double anchor cable with shock absorber (EN 355). The operator will ascend the exterior of the nacelle with an appropriately sized portable ladder which will be attached the nacelle's rail or anchor points (in the V90 3MW) to prevent movement, and once the operator can reach the rail during the ascent, he or she will attach an anchor cable with a shock absorber (EN 355) to it, until he or she is on top of the nacelle. For displacement on the nacelle, a second anchor cable with shock absorber will be used so the worker can alternate between the two, and always remain anchored to a fixed point.
- It's not allowed using polystyrene blocks to enter in the nacelle, It's mandatory to use a ladder like picture below.



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- While the nacelle is stored, decide in advance which tools and materials will be necessary to mount the nacelle, and use the rotor to lift them to the interior of the nacelle.
 - Turning gear to be installed
 - Wiring (this may be preinstalled if the work conditions require, in order to proceed with work)
 - Bottles of oil if the machine is supplied with oscillation absorbers
 - Nuts and bolts, hydraulic equipment for pitch, turning gear, etc
 - The draining hoses above the generator and controller may now be removed from the nacelle, and later the opening may be covered with joint filler.
 - Remove the covers from the nacelle's roof from the exterior, in order to position the hoisting tool.
 - Tie the hydraulic hoses and power supply cables firmly in a bundle near the interior conductor of the main shaft to prevent it from being trapped during the hub's assembly.

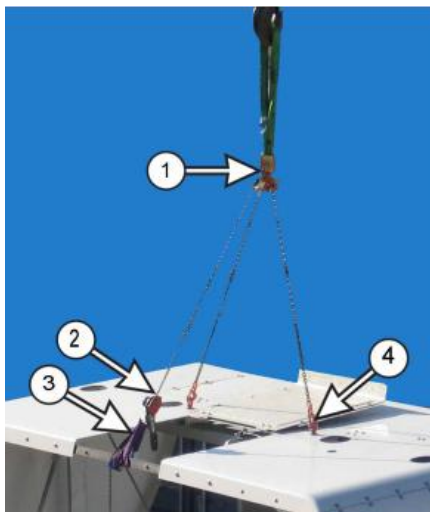
2.2.16 TOP COOLER INSTALLATION

- The top Cooler assembly should always be carried out using a freestanding crane, supplied by company subcontracted by VESTAS landlady. Except for the whole crane lifting material is proper to VESTAS (shackles, slings, hooks ...) to be approved to carry out the operation according to the installation manual and ensures operational control by competent thereon.
- Despite these controls, the subcontractor responsible for mounting visual shall review prior to use with the help of a checklist pursuant to the internal instruction VESTAS 30.01.01 MED INS to verify the non-existence of a visible deterioration that may have arisen during its use among their regular inspections. Likewise, the landlady of the crane company will ensure the suitability and condition of these, delivering documents to corroborate the respective revisions, and the qualifications of operators that lead. Through these control systems ensures that the development of the hub assembly to the nacelle, which at certain moments of the same requires the presence of personnel in the vicinity of the suspended load, the risk of detachment of the object by breaking the lifting equipment will be reduced to tolerable levels.



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For the lifting of the Top Cooler need a set of strings with two hooks and a pulley.



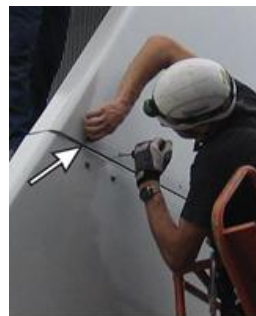
1. - Set of two hooks of 1.5 m and 2 tons.
2. - Pulley of 500 Kg
3. - Sling 2 mts. SWL 1000Kg.
4. – Anchor point RM M20.

- The Pulley assembly will be made to avoid swinging during hoisting Top Cooler, which is why, so it should fit snugly between the crane hook and the structure of Cooler pto shown in image.
- It is recommended ultrasonic sensors and even light aircraft before joining the cooler to prevent later installation in conditions of increased working height. This assembly consists essentially in the assembly of a small metal structure on the radiator or Top Cooler and which subsequently installed anemometers and vanes aviation light is accompanied by its own supporting structure supporting structure. In any case it would be used for fall arrest system.



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- Once oriented into position and fixed in its upper brackets of the nacelle comes your screwed to the supporting structure side by personnel from lifting platform or scaffold.
- Once assembled, one proceeds to the connection of the sleeves to the corresponding conduits of the nacelle.
- Finally we proceed to fill the expansion tank cooling system



- For both the Top Cooler mounting to any work that is to be conducted on the roof of the nacelle are reminded that should be done with the team to work at height and properly anchored to the anchor points referenced in yellow on the line central longitudinal section of the nacelle.
- It is advisable to install the ultrasonic sensors and aviation lights before assembling the nacelle, so they do not have to be installed later at a height of 80 metres. This mounting fundamentally consists in installing a small metallic structure upon which the anemometer vane and aviation lights will be installed; it comes with its own supporting structure. The aviation light mounting pivots and turns on hinges, allowing the aviation light to move upon the platform so that it is situated on one of the sides of the nacelle. This way the installation and service work may be performed from the nacelle's roof, without having to leave the roof. In both cases, the previously mentioned fall arrest system must be used (see image).
- Last, the flange, the nacelle floor and the main shaft must be cleaned.

9. PREPARATION AND INSTALLATION OF THE HUB

The most relevant tasks which may affect the health and safety of the workers are listed below:

- First, ensure the stability of the ground where the element is stored. If it is unstable, the element could overturn during handling.

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- The blade hub assembly must always be carried out with a self-supporting crane, provided by the rental company subcontracted by VESTAS. With the exception of the crane, all the lifting material will be VESTAS property (shackles, slings, hooks, etc.) and approved to perform the operation in accordance with the installation manual, and its operational control will be ensured by an authorised individual. Likewise, a self-loading lorry, telescopic manipulator and another auxiliary crane will be used to support the blade hub's storage frame when they are being separated from each other, thus preventing it from falling once the bolts are released.
- Despite all controls, a designated employee from the subcontracted company will perform a visual check before using it to confirm that there is no visible deterioration which may have occurred when it was used between periodic inspections, the checklist **FR096** will be used for this process, in accordance with the internal instructions **VESTAS MED INS 01.01.01**. Likewise, the crane leasing company shall guarantee the crane's suitability and good working condition, providing documents which corroborate the corresponding inspections, and it shall also guarantee the qualifications of the crane driving operators. With these control systems we can guarantee that the risk of the object coming loose due to equipment breakage will be reduced to tolerable levels while assembling the blade hub in the nacelle, as there will be certain, specific moments in which personnel must stay in the area of the suspended load.
- It must be confirmed that the serial numbers from hub and the nose cone coincide so they can be easily matched.
- Preparing the nose cone: With the VESTAS approved device, the nose cone shall be lifted and fitted upon the blade hub, aligning the bolt holes so the bolts can be inserted later. These are removed from the nose cone's control cabinet once the nose cone is supported upon the hub (no one may stay under the suspended load). A portable ladder will be used in order to position the bolts. Later, DO NOT seal the hub joints with joint sealer.



- Installing the lifting equipment. The hub lifting equipment will be attached to the crane in order to be

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fixed to the blades' ring wheel.



- Once the equipment has been attached, the hub must be lifted with the crane, using its hydraulic system turn it until it is in the horizontal position, this is the position for assembly with the nacelle. During the assembly, nobody may remain inside the blade hub.



- The next step is to remove the mounting frame from the hub. To prevent the hub from overturning upon personnel when they remove the locking bolts, it must be supported with an auxiliary crane, self-loading lorry or equipment with similar characteristics which can support the frame's weight.

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- If necessary, clean the thread with a bottlebrush.
- If the flanges are dirty or greasy, clean them before assembly with the nacelle.
- The guide pins should be placed in the perimeter of the rotor locking disk to align the blade hub with the shaft.
- Guide the hub towards the front section of the nacelle. If the desired angle between the hub and the flanges of the main shaft is not created, it can be reduced by using the hydraulic unit of the rotating device for adjustment. Special attention must be given to the hoses when connecting the hub and the nacelle, and it must be ensured that nobody enters the hub or nacelle during assembly.



- Use as many bolts as possible and tighten them with the MAQUITA or a similar tool. These must be previously lubricated. It is important to completely tighten at least half of the periphery with the MAQUITA before dismantling the lifting equipment. Once the bolts are adjusted, the four guide pins can be removed and replaced with the hub bolts.

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- The bolts must be retightened with the hydraulic tightening tool specified in the installation manual.
- Install the hydraulic and electric system in the rotor.
- To finalize the process install the covers on the rotor locking disc.

10. INSTALLING THE NACELLE ON THE TOWER

The most relevant tasks which may affect the health and safety of the workers are listed below:

- To lift and assemble the nacelle, use a self-supporting crane with the appropriate load characteristics (weight and dimensions), provided by the rental company subcontracted by VESTAS. With the exception of the crane, all the lifting material will be VESTAS property (shackles, slings, hooks, etc.) and will be approved in order to perform the operation, in accordance with the installation manual, and its operational control will be ensured by an authorised individual.
- Despite all the controls, a designated employee of the subcontracted company will perform a visual check before using it to confirm that there is no visible deterioration which may have occurred during use between periodic inspections, the checklist **FR025** (FR032 for the V90 3MW) will be used, in compliance with the internal instructions **VESTAS MED INS 90.3.30**. Likewise, the crane leasing company shall guarantee the crane's suitability and good working condition, providing documents which corroborate the corresponding inspections, and it shall also guarantee the qualifications of the crane driving operators. With these control systems, it can be guaranteed that while assembling the nacelle the risk of an object coming loose due to breakage in the hoisting equipment is reduced to tolerable levels, which is important because personnel must remain under the suspended load and also in its area during precise determined moments during assembly when it is being placed on the tower section.
- First, the nacelle lifting device must be installed; fasten it to the crane and position it on top of it, so

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the installation technicians can fix the slings to the corresponding anchor points in the nacelle, using the shackles to lift it.



- Lower the service box and the power supply wire from the lifting equipment and place them on the sensor's cover plant, positioning it so they can be reached when the tower and the nacelle are assembled.



- Position the guiding ropes, one on the front end and the other on the back end of the roof rail, so the operators can guide the load from the ground.



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- Lift the nacelle and its frame a few metres in case it needs to be centred in relation to the crane, and put it on the ground again. Personnel must stay away from the load during this step.
- Confirm that there is no material on the platform which could interfere either when moving the nacelle or with the personnel that must be displaced on the ground to guide it with the guiding ropes.
- Release the nacelle from the transport support, and remove the clamping bolts.
- Lift it 1.5 m, in order to insert the guide bolt which will facilitate its eventual assembly on the tower. This bolt will be inserted from the side of the nacelle; personnel must avoid standing underneath the nacelle. If dirt is found on the bottom of the nacelle, it must be cleaned with pressure cleaning tools or tools with long handles, so personnel are not under the suspended load.
- Before lifting and assembling the nacelle, confirm that the top flange in the uppermost section of the tower, where the nacelle will be placed, does not have any irregularities. If there are any irregularities, they must be eliminated.
- Begin lifting and assembling it on the tower. No worker may stay inside the nacelle, or under the area with the suspended load.
- Before placing the nacelle on the top flange, remove any lubricating grease from the flange.
- Place the nacelle on the top flange of the uppermost section of the tower, guiding it to the correct position with the anchor blocks (bananas). If necessary, the nacelle can be adjusted by using the lifting equipment's service box.
- Begin to insert and tighten the bolts, first with the electric tightening torque and later – within 48 hours, before putting it in the "Free Wind" position once the assembly is finished – complete retightening to the final torque, using the hydraulic tool as indicated in the installation manual.



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- Once the torque has been completed the lifting equipment can be uninstalled to be brought to the ground.
- Reinstall the fibreglass covers on the nacelle roof from the entrance of the lifting device and seal them.
- Remove the guiding ropes. Warn ground personnel that the ropes will fall.
- Install the yaw cable in accordance with the installation manual to allow the nacelle to be positioned for the later installation of the rotor blades.

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11. HORIZONTAL INSTALLATION OF EACH OF THE ROTOR BLADES

The most relevant tasks which may affect the health and safety of the workers are listed below:

- To lift and assemble the blades, use a self-supporting crane with the appropriate load characteristics (weight and dimensions), provided by the rental company subcontracted by VESTAS. All the other lifting material will be VESTAS property (shackles, slings, hooks, etc.) and approved in order to perform the operation in accordance with the installation manual, and an authorised individual will ensure the creation of an operational control.
- Despite all the controls, a designated employee of the subcontracted company will perform a visual check before using it to confirm that there is no visible deterioration which may have occurred during use between periodic inspections, using the checklist **FR026 and FR060**, in compliance with the internal procedures **VESTAS MED INS 30.01.01**. Likewise, the crane leasing company shall guarantee the crane's suitability and good working condition, providing documents which corroborate the corresponding inspections, and it shall also guarantee the qualifications of the crane driving operators. With these control systems, it can be guaranteed that while assembling the nacelle – a process which requires the presence of personnel in the area of the suspended load at precise, determined moments during the assembly – the risk of an object coming loose due to breakage of the hoisting equipment is reduced to tolerable levels.
- It is important to confirm that before personnel enter the blade hub once the nacelle is assembled, that the mechanical lock be set to avoid its uncontrolled spinning, which could injure the workers.
- To begin the hoisting, the mounting frames used to transport and stabilise the stored blade must be removed. Likewise, given that the blades are transported in the leading position, it will be necessary to turn them 90° for their assembly with the rotor. To do so, use two cranes which will hold the blade, one positioned one metre from the root of the base, and the other at the upper section, using flat slings. The sling positioned on the root will be connected to a manual service crane, and this will be connected to the one of the crane's hook. The other crane will only be used to support the blade. Then, the blade must be minimally lifted by both cranes to remove the mounting frame.
- The frame at the root will be held by an auxiliary crane or self-loading lorry when the clamping bolts are beginning to be removed from the blade. The frame must not be allowed to fall when it is detached from the blade.

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- Next, begin to release the chain from the manual service crane, installed between the sling and the crane hook at the height of the blade root, feathering the blade. Once it has been feathered, it should be placed on the ground again, upon elements like polystyrene or pallets to ensure it is stable. The blade may also be feathered by using a double hook crane, at root level, and the same flat sling by attaching one end to one hook, and the other end to the other hook, so that by elevating one of these ends the blade will feather.



- Before lifting the blades, the threads at the root of the rotor blade must be screwed down using the portable electric tool. If necessary, the spaces in uneven burrs can be cleaned with a brush. Never use a disc couler.

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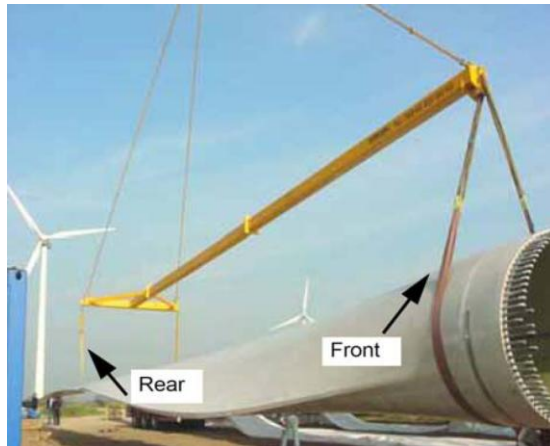


- The blade sleeve can also be installed, and the exterior can be cleaned with a pressure washer. Personnel may not position themselves on the blade to perform these operations. If necessary, use tools with long handles to reach all of the areas that need to be cleaned.
- If we are using a hydro cleaner with combustion engine we must have a fire extinguisher close to the area where we are working.



- Once the blade is prepared, it may be lifted and assembled to the blade hub. It must be in the appropriate position in relation to the crane and the blade to be installed. The blade will then be anchored to the lifting beam by attaching a sling one metre from the root, and putting the cradle in the position shown on the blade, the crane should then lift it to the correct position. If the bottom needs to be cleaned, this can be done once it is raised 1.5 m, using elements that allow workers to keep a safe distance from the load. Never perform any work under the suspended blade.

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- Attach two guiding ropes to guide the blade from the ground. These should be tied to each eye bolt on both sides of the lifting cradle. If the wind speed is greater than 8 m/s, it is advisable to use a blade bag on the blade tip and tie the two guiding ropes on it the same way to position it.



- Once the blade is near the blade hub, two technicians inside the hub must guide the crane operator and the ground personnel, indicating how to position the blade with the guiding ropes, as well as an operator on the inside of the nacelle, who handles the portable hydraulic unit connected to the hydraulic system for the feathering of the blades, which is necessary to feather the bearing on the base where the rotor blade is attached to facilitate its correct assembly.

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- Remember that before personnel enter the blade hub, its revolution must be mechanically locked. Personnel entering the blade hub for the first and second rotor blade must go in through the same hole in the ring wheel where the blade will be attached, or between the hole between the hub and the fibre shield when this is closed. For the third blade personnel should go in between one blade and the other. Personnel must always use a fall arrest system which includes a complete safety harness (EN 361) and a double anchor cable with shock absorber (EN 355) to alternate the lashing at fixed points like the hub structure (if necessary using a EN 795 sling), and the hub anchor point, so the operator is always connected, preventing a fall from height.



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- Once assembled, attach the washers and nuts, they must be torqued with an electric spanner (Maquita), turning the ring wheel with the hydraulic unit system, in order to access all of the bolts. The blade lock system will be placed in the four largest spaces; it can be installed the same way, with the blade locked at 96°.
- Once the torque has been performed, the lifting equipment may be removed, with one person located above the nacelle while the crane driver bring the lifting tool near so that the technician can release the sling that is attached to the blade by the root. Once the sling has been released remove the cradle, displacing it along the length of the blade with the crane.



Nº1



Nº 2

In the picture No. 1, at the time of disengaging the sling must be made as follows:

1 should always be anchored to an anchor point.

2 Also, to avoid stay hung from the nacelle in case of slip, must use a block retractable anchored within the nacelle to an anchorage point, Another possibility is use the positioner rope anchored one end to an anchoring point of the roof and the other side to the harness

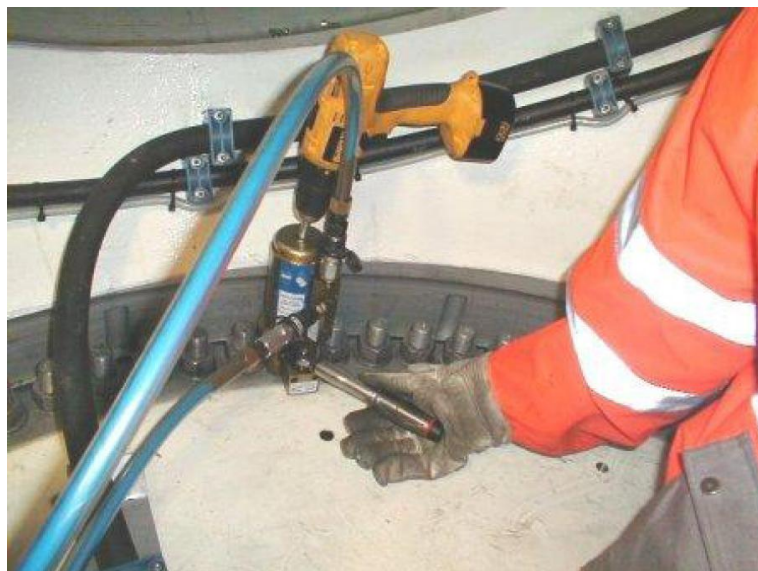
Once the lifting equipment has been removed and the crane will not interfere with the rotor feathering,

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it can be turned with the turning gear to place the next bearing in a horizontal position so another blade can be installed. During these turns no personnel may stay inside the blade hub. Remember that the rotor must be unblocked for these turns, and once it is in the appropriate position lock it again.



- With the rotor turned, a new rotor blade can be installed, following the same steps used for the first.
- When the three rotor blades have been assembled, they must be retightened with a hydraulic pressure tensioner, placing the blade being tightened towards the ground. When entering the hub ensure that its protective plate is installed to prevent falls in the interior of the blade.



- When the retightening is finished, install the cable bridge for the lightning rods, complete the installation of the blade sleeve and seal the seals between the blade and the bearing, and between

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the blade and the tooth ring.

12. INSTALLING THE HV WIRE IN THE TOWER.

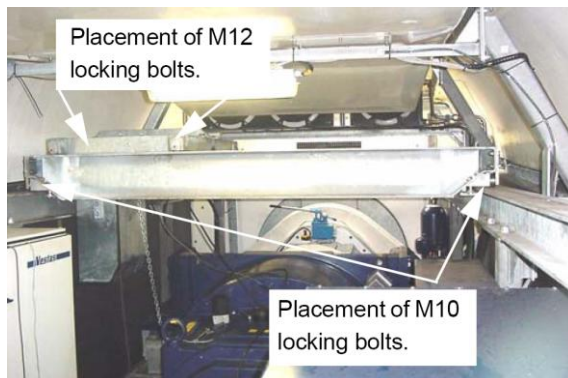
The most relevant tasks which may affect the health and safety of the workers are listed below:

- Because the wire comes rolled on a drum, it must be placed on an approved stand.



- The internal crane in the nacelle should be used to lift the power wire (except for wires for 105 m towers, which are installed with a more powerful crane). All lifting material will be VESTAS property (shackles, slings, hooks, etc.) and approved in order to perform the operation in accordance with the installation manual, and an authorised individual will ensure the creation of an operational control.
- Despite all the controls, a designated employee of the subcontracted company will perform a visual check before using it to confirm that there is no visible deterioration which may have occurred when being used between periodic inspections, in accordance with the internal procedures **VESTAS MED INS 01.01.01**. With these control systems, it can be guaranteed that while lifting the wire – which requires the presence of personnel in the area of the suspended load, at precise determined moments during the assembly – the risk of an object coming loose due to breakage in the hoisting equipment is reduced to tolerable levels.
- Disassemble the rubber damper on the left side of the travelling crane in the nacelle. It will then be displaced on the gearbox, as far to the left as possible, and then locked in both directions.

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- The chain can be lowered between the main crossbars and the gearbox, and then through the opening in the top platform. If it rubs too much against the gearbox, place a piece of wood in that area



to protect it; likewise we must feather the nacelle so the descent of the chain is as straight as possible. A technician will accompany and guide the chain during its descent.

- To prevent friction with other elements in the machine, one guide wheel shall be placed in the top platform, and another on the ladder at the beginning of the wire's path in the bottom platform.

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- Once it is down, attach a 13 m hoisting grip to the end of the wire, and connect it to the internal crane's hook to begin the lifting. The 13 metres will support the chain by using flanges to prevent the wire from catching on the wind turbine structure.



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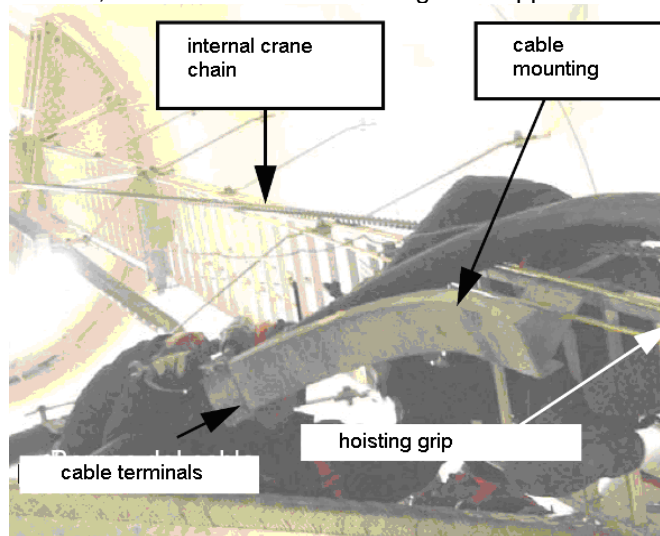


- If, due to the wire's weight, it cannot be lifted with one grip, stitch on a new grip once it has gone up the first 32 metres in order to pull from two points, in accordance with the machine's installation manual.
- Once the wire reaches the top wire's mounting, the cable can be guided from above, and it is displaced towards the transformer housing. To displace it towards the transformer's housing, tie a rope to the end of the wire in order to pull it. Once this has been correctly positioned in the transformer's housing, the crane hook should be on the top platform.
- Then assemble a service crane on the upper platform at the height of the top mounting to connect the hoisting grip to the one that is attached to the internal crane. Raise the wire a few centimetres with the chain hoist to release the internal crane. This method allows the chain hoist to bear the wire's weight.

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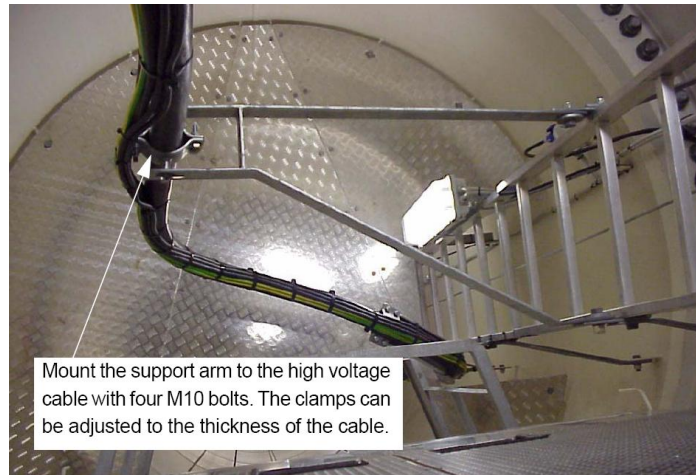


- Lower the internal crane again, to around two metres below the bottom mounting. At this point a new hoisting grip must be mounted, form a buckle when raising it to support and attach to the mounting.

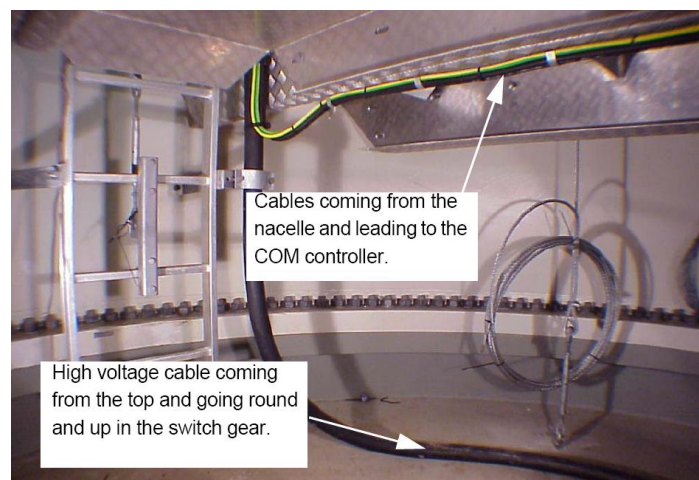


- Reduce almost all of the voltage in the internal crane that is supporting the wire. But not entirely, to prevent damaging the bottom mounting until the wire shackling to the ladder's flange is complete.

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- Once the wire is positioned through the length of the tower and is in the transformer's housing, put the lower end under the bottom platform, near the HV main circuit breaker to be fitted later.



13. INSTALLING THE HV WIRE IN THE TRANSFORMER

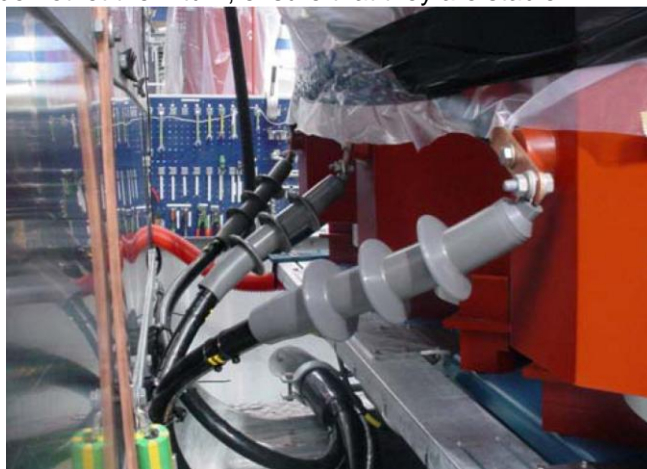
All work with the high voltage cables must be performed with the utmost care, even small installation deviations may cause failures, due to the high voltage.

- The cable bearer and the corresponding clamps must be attached to the trajectory around the transformer's housing with an appropriate tightening torque, in accordance with the technical specifications in the machine's installation manual.
- To avoid damage caused by edges they must be set against edge protectors.

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- The ends of the conductor wires may not be folded to prevent the distortion of the lines in the electric field, because with time the wire's insulation will deteriorate, hence, the ends are prepared with special materials which favour their stiffness and insulation (bottles). When fixing the ends in the transformer terminals, do not let them turn, ensure that they are stable.



- Install the ground cable in the ground terminal.
- Once the wires are installed in the transformer ensure that none of the wires are touching, this prevents the vibrations from creating wear which could create a short circuit. Likewise, confirm that the wire's twisting radius falls within the technical specifications in the installation manual. If this is not the case, reconnect the wires so the specifications are met.
- Check the following safety distances, as established in the minimum distance table:
 - ✓ A: minimum distance between uncovered copper conductors with electric voltage on metal parts connected to the nacelle's base frame.

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- ✓ B: minimum distance between high voltage windings with electric voltage on metal parts connected to the nacelle's base frame.
- ✓ C: minimum distance between uncovered copper rods which connect high voltage windings.
- ✓ D: minimum distance from the exterior copper rod with electric voltage on metal parts connected to the nacelle's base frame.

Voltage range	A [mm]	B [mm]	C [mm]	D [mm]
6-12 kV	120	110	30	20
12-24 kV	220	165	60	40
24-36 kV	320	280	100	70

14. LIFTING OF ELECTRIC CABINETS TO THE FIRST PLATFORM

Once the turbine is mounted, the electric panels that had remained on the foundation are lifted to the first platform (ground controller, UPS rack and cell). To carry out this operation, the trap doors on the first platform are removed and the panels are lifted using a chain pulley block attached to the anchorage points underneath the second platform.

The following safety measures should be applied:

1. Workers not specifically involved in this job will not be allowed in or out of the tower.
2. Since this job does not impact on the rest of the turbine's assembly operations, it will be scheduled when no other simultaneous jobs need to be performed on it to prevent workers not involved in this job from falling off.
3. At any rate, if other jobs are being performed on other parts of the turbine, the workers involved in such tasks will not be allowed to move over to the first platform and, therefore, either enter or exit the turbine while the trap doors are removed.
4. If the assumption under section 3 occurs –i.e. if workers are in the nacelle or in other parts of the turbine– another sign will be installed at the second platform's level (danger of falling from height) as well as a barricade tape to block the way.
5. At all times and until the job has been completed and the trap doors have been replaced, the access to the tower will be signaled and marked indicating any danger of falling from height. No work team or employee should enter the turbine until communicating with the work team already inside the turbine and receiving their instructions, as indicated in section 3.

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6. The team removing the trap doors will not be allowed to leave the first platform without having replaced them first.

7. In order to remove the trap doors, a ladder will be used according to the height and work position required. No polystyrene blocks will be used.



MANDATORY USE OF ANTI-FALL PROTECTION WITH OPEN DOOR TRAP:

The anti-fall protection should be used as follows:

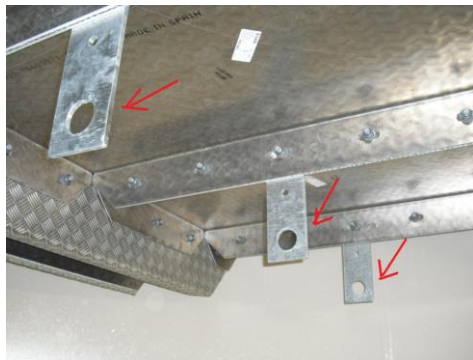
- While the door traps remain open, a maximum of 4 workers may be on the first platform.
- The technician in charge of handling the hoist will connect his shock absorber-fitted rope to the ladder.
- Technicians requiring more mobility will use retractile anti-fall systems anchored to the second platform.
- If a fourth anchorage point is necessary, a retractile anti-fall system will be used, but in this case

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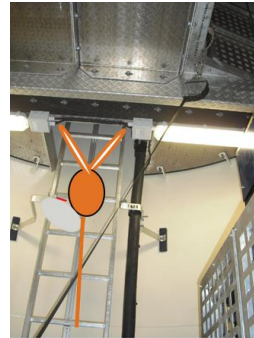
fixed to the ladder.

- In order to mount these 3 retractile pieces of equipment, the following material will be necessary:

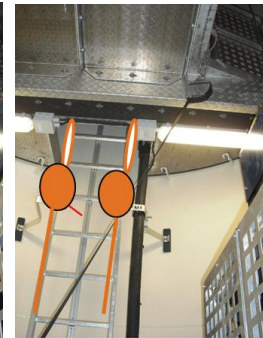
ASSEMBLY OF TWO ANTI-FALL SYSTEMS ON THE SECOND PLATFORM:



Nº1



Nº2



Nº3

- 1.- It can be placed only one fall arrest in one of the holes of the platform as seen in picture nº1.
- 2.-The second block should be placed on the ladder as in picture 2
- 3.- If you need a third option, two blocks are placed as seen in picture 3.

PRECAUTION: A retractile anti-fall system of less than 6 m would reduce the mobility and could cause a fall.

The retractile anti-fall system will be connected to the harness back ring as shown in Pictures 4 and 5.



Picture 4. Retractable anti-fall protection; Picture 5. Retractable anti-fall system connected to the ring

- To remove and replace the trap doors, a ladder will be used. No polystyrene blocks can be

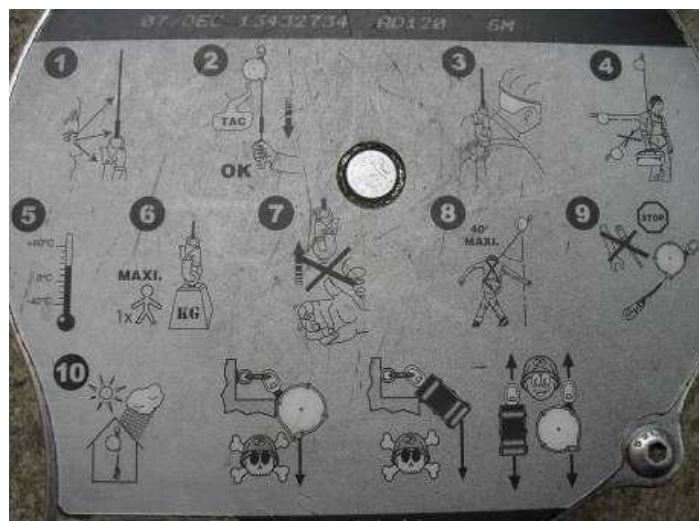
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utilized.



Picture 8. Using a ladder to remove the trap doors

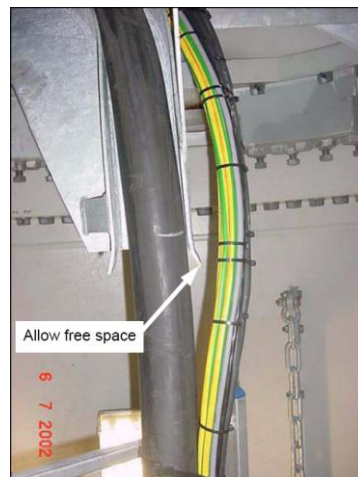
- Attention should be paid to any movement made by the 3 workers using the retractile systems to prevent their entanglement.
- The basic safety standards for the use of retractile anti-fall systems are detailed below.



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15. INSTALLING THE HYDRAULIC AND ELECTRIC WIRING

- This section address low voltage wiring (for lamps, power points, etc.), optical fibre cable communication and grounding, as well as hydraulic hoses pending fitting (hub).
- It is important to understand the turbine's electric and hydraulic diagram, and visualize the installation, to correctly guide and fit them.
- When lowering the necessary wires for the tower, one person must be on the top platform, another in the loop of the lower wire and another on the bottom platform to guide the wires, keeping them from catching. Once they have been extended throughout the tower, the wiring can be carried out from top to bottom, guiding it towards its installation points (lamps, power points, etc.), and grounding clamps.
- During the wiring process, the wires must not create any friction with the metal parts.



- Protective tubes must be installed on the platforms and handrails where there is risk of swinging wires.

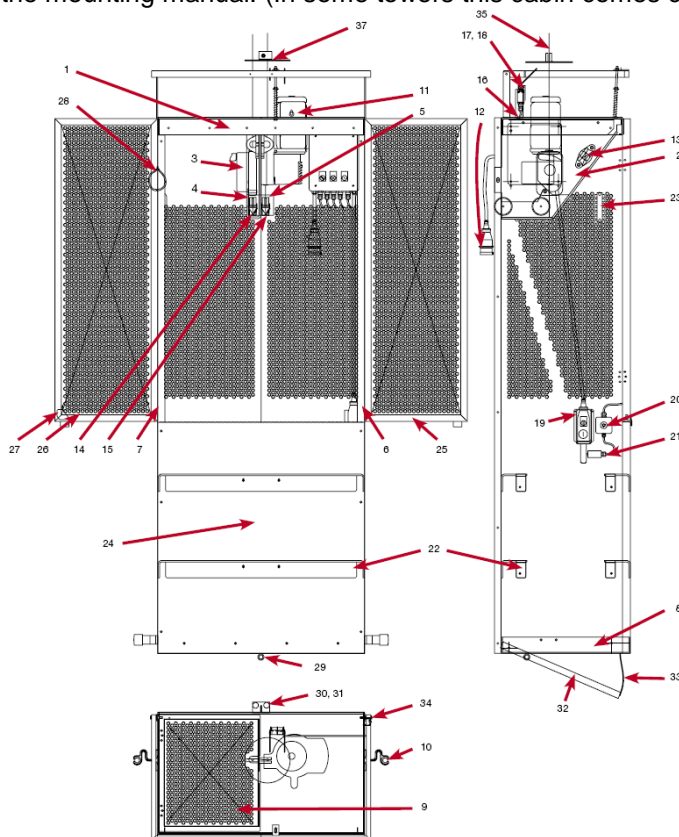


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- As a general norm, the installation technician must ensure that flexible tubes, wires, etc. are long enough to follow the movement of the rotational systems, and must also ensure that there are no marked curves; all elements must have the appropriate length in each case. To prevent the wires from breaking, it is also important to attach them carefully to the flanges to prevent them from hanging loose. The holes in the metal platforms designed to allow the wires to pass through have protected edges.
- During the installation process the electrical circuit which is being worked on must be voltage free and the hydraulic system must be depressurised.

16. INSTALLING THE HOISTS

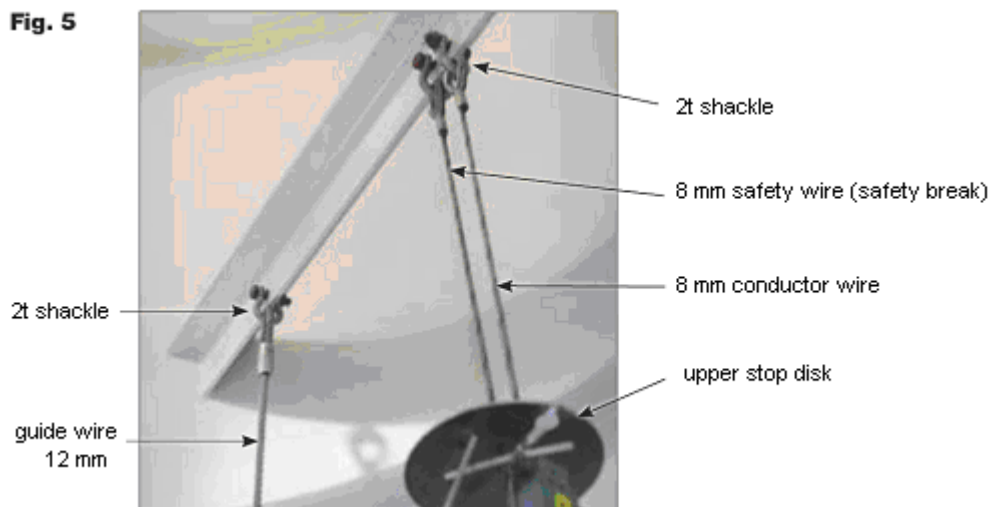
- The most relevant tasks which may affect the health and safety of the workers are listed below:
- Mounting the cabin on the bottom platform, in accordance with the hoist manufacturer's directions in the mounting manual. (In some towers this cabin comes completely installed).



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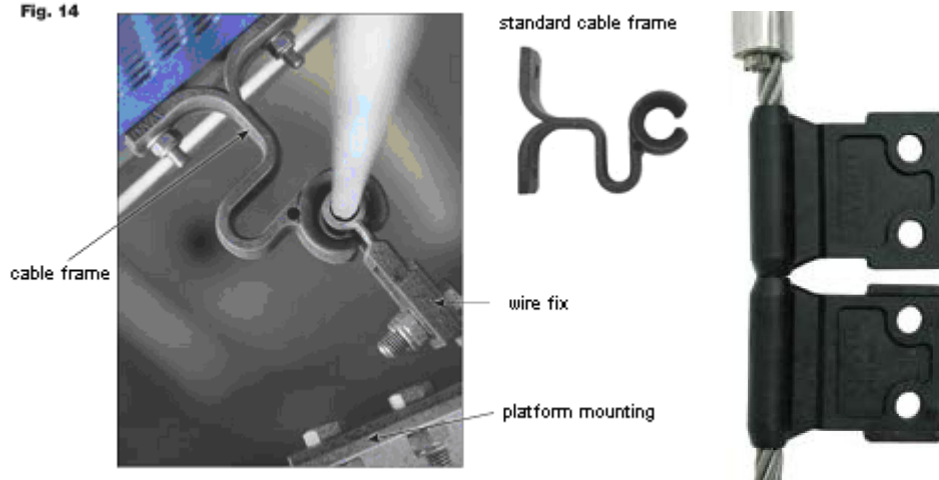
- Lift the wire coils and necessary tools to the nacelle with the nacelle's inner crane and transfer them to the top platform of the tower where they will be attached to the hoist.
- Begin to attach the guide wires, safety wire and conductor wire to the beam located on the tower's top platform. Use this opportunity to install the upper stop disc.

Fig. 5



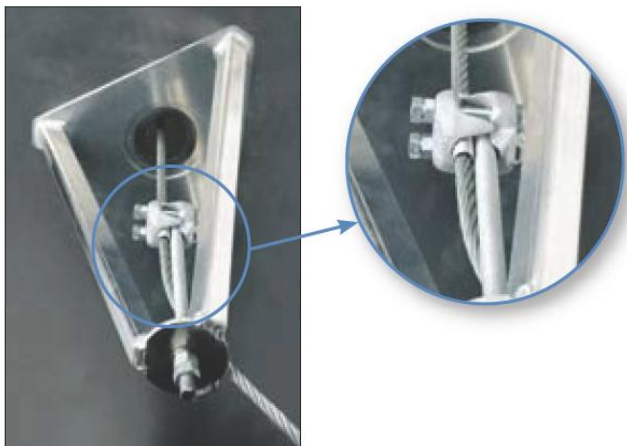
- Once these wires are anchored, lower them to the bottom level.
- Put the number of wire fixes that will be installed along the length of the lift on the guide wires and attach them to the platform mounting, as seen in the image, to correctly guide the hoist later on.

Fig. 14

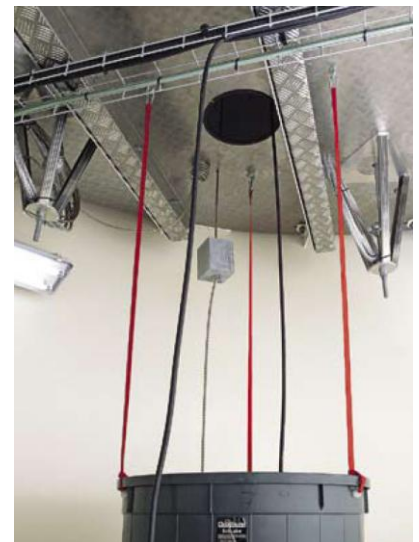


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- On the floor level, put the guide wire through the openings to continue fastening and tautening them. Both wires shall be fastened with a tripod under the bottom platform in accordance with the instruction manual, by attaching the wire to the tripod's central aluminium tube, so they can be tightened with the screw later on, in accordance with the manufacturer's specifications.



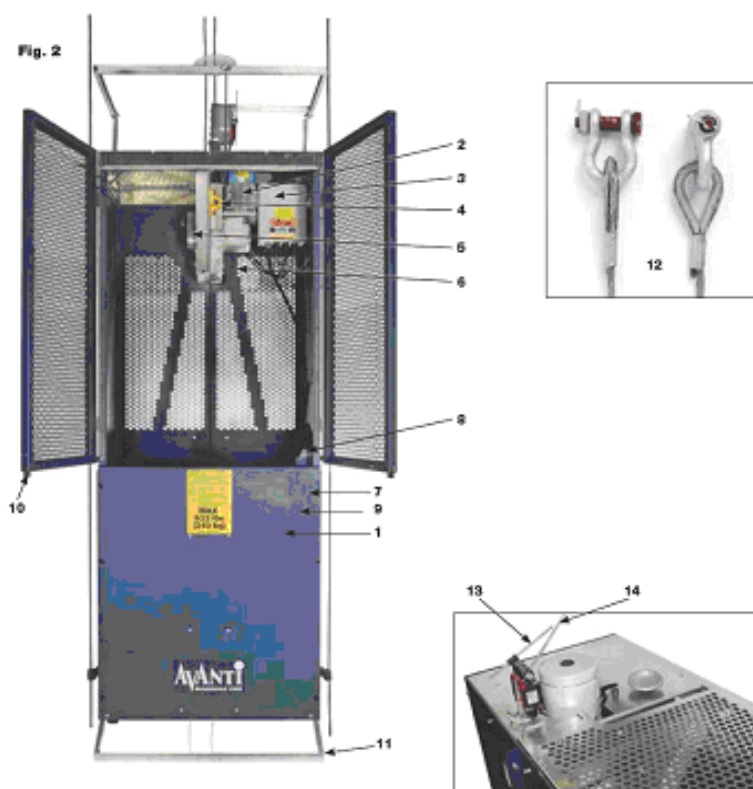
- Next, the electric fittings for the hoist's power supply may be completed. The hoist's electric supply must be protected with a fuse and a grounding circuit with a 30mA degree of protection. Ensure that the turbine's network grid and the motor voltage are identical. The fitting must be carried out as follows:
 - Press the emergency stop bottom
 - Ensure that different circuit breakers in the safety break's wire stop are connected to the power supply panel based on the colour code
 - Place or hang the wire collector pail under the platform
 - Connect the power supply cable plug to the panel
 - Deactivate the emergency stop
 - Fit the current so that the green light turns on
- Once the lift is connected, install the conductor that descends from the beam where it is anchored. To do so, remove the rubber protection guards from the rollers and take the wire through the roof, putting it into the opening in the hoist's emergency break, push UP on the controller



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to make the hoist go through its entire route, manually guiding it, and at the end remove it from the rear section of the hoist. Pull the cable to make it taut, and put the rubber guard on again.

- The safety wire will be installed the same way, removing the rubber guard from the rollers, and taking the wire through the opening of hoist's roof, through the retaining device in the safety brake, and continuing along the same path as the conductor wire, removing it at the end from the rear section of the hoist. Pull the cable to make it taut, and put the rubber guard on again.



1 Cabin	7 EMERGENCY BREAK fixed button (inside the cabin)	12 Shackle
2 Traction hoist	8 Hanging control	13 EMERGENCY limit stop circuit breaker
3 Electrical control box	9 Override circuit breaker for automatic function mode	14 Operation limit stop circuit breaker
4 Anchor point	10 Door stop circuit breaker	

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5 Safety retaining device in the safety brake	11 Lower safety stop	
6 Fitting cable (behind the hoist)		

- Then begin to put both of them through the corresponding openings on the wind turbine's bottom platform so they can be fastened. The conductor wire must be moved by attaching a counterweight, and the safety wire will be attached to the platform with a spring

Fastening safety wire



Conductor wire counterweight



- Once everything is installed the guide wire can be adjusted with the hoist's guides.



- To finish the process, adjust the end stop disc so that the end stop system detains the hoist, the way overload device is adjusted.

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Depending on where the tubes come from, both the cabin and the wiring arrives pre-installed, so installation is not necessary.

17. ACTIVATING THE HOISTS AND THE SAFETY RAILS/LADDERS

Activating the ladder/safety rail set:

Once the lifting process is complete and all of the tower sections have been screwed down and tightened, the different sections of the ladder and the safety rail can be joined as indicated in the manufacturer's instructions. Immediately afterward, an authorised individual must inspect the facility and confirm that there are no defects, so that personnel can begin to use it. The inspection is registered by completing the test report and by putting a label with the inspection results, COMPLIANT/NON-COMPLIANT, on a visible area of the ladder; it should include the inspection date and inspector's identification, in accordance with MED INS 30.01.02 instructions.

If the safety rail is determined to be non-compliant, it must be clearly identified as such, and there must be a notice on the ladder indicating the need to use a fall arrest system with double anchor cables.

Activating the hoists:

Before activation the hoists must be inspected by an authorised business/individual that can certify the inspection by filling out the corresponding inspection report, which will determine if it is COMPLIANT/NON-COMPLIANT and include the date of inspection and inspector's identification, in accordance with MED INS 30.01.02 instructions.

Until the hoists have been inspected and deemed compliant they must remain disconnected from the electrical grid and the doors will be blocked with flanges so they cannot be used.

NOTE: The hoists may only be used to lift people; it is prohibited to lift machines and tools with them. Each business that uses the hoist must train its personnel regarding the hoist's correct use, the safety rules and emergency devices.

The inspection certificates shall be delivered to VESTAS' Service Department during the handing over meeting.

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18. ENERGIZATION AND COMMISSIONING

The commissioning process is a final check of the wiring installation and the correct functioning of the system once it is entirely assembled and all the fittings to the medium voltage line and the interior between the cell and the transformer are completed in each wind turbine. This must be performed before the turbines are used and begin producing energy. The main activities involved in commissioning are the following:

1. Electrical fitting, Circuit breaker latching and a check of its functions
2. Processor commissioning (introducing software)
3. Preparation for the check and commissioning (service mode)
4. Checking the meteorological parameters
5. Annotations on the program version, language selection, IP address and voltage supply measurement with VCS
6. Reading production meter
7. Checking the blade feather hydraulic system
8. Reviewing safety functions
9. Adjusting blade hub sensors
10. Checking the yaw system
11. Checking and adjusting the blade feather system
12. Rotation sensors check
13. Checking the gear oil system
14. Checking the nacelle's positioning
15. Checking fans, heaters, lubricator and coupling
16. Visual check of the cooling circuit
17. Check while in Operation mode
18. Checking rotor and generator overspeed
19. Configuration of remote control
20. End of commissioning

To do so, follow the instructions included in "Commissioning procedure" in the operation and installation manual, as well as any of its related documents.

Electric fitting

Emphasize health and safety during every step, the first, in which the electric fitting is completed, (latching the F60 circuit breaker) has serious risks of explosion and contact with high voltage electricity. As a consequence, from a safety perspective, we must require all personnel involved in the operation to

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be coordinated for its implementation.

During this fitting the following protocol must be followed. Each step is included, even those which must be performed from the substation (DEVELOPER'S responsibility), so the complexity of all the work can be understood, as well as the activity coordination which must take place between all the businesses involved, VESTAS as the wind turbine supplier and the DEVELOPER.

STEPS for energization	RESPONSIBLE
1. The power transformer must have been previously connected and idling for 24 hours.	DEVELOPER
2. The corresponding "Risk of electric shock" signs must be hung at the wind turbine entrances, and it must be confirmed that there is no personnel inside.	VESTAS
3. Confirm that the nacelle's (Q8) main circuit breaker is in off state.	VESTAS
4. Carry out the following checks on the turbine's cells: <ul style="list-style-type: none"> • Power transformer protection cell is in off state and in locked earth. • Entry cell/MV output circuit in on condition and earth is unlocked. 	VESTAS
5. Ensure that personnel are not in the wind turbines to be energised.	DEVELOPER/VESTAS
6. Close off access roads to the wind turbines.	DEVELOPER
7. In the substation, cell latch manoeuvre of circuit header cell n. Earth is unlocked and in on condition.	DEVELOPER
8. 15 minute wait.	DEVELOPER
9. Visual check for voltage in turbine cells, and confirmation that there are no abnormalities.	DEVELOPER/VESTAS
10. 4 hour wait.	DEVELOPER
11. Visual check for voltage in turbine cells, and confirmation that there are no abnormalities.	DEVELOPER/VESTAS

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Energization STEPS for power transformer protection cells in wind turbines	RESPONSIBLE
1. In substation, put circuit header in off state and circuits in locked earth. Off state and locked earth.	DEVELOPER
2. Manoeuvre to start up power transformer protection cells in turbines in the circuit: <ul style="list-style-type: none"> Power transformer protection cells in turbine (F60) in on condition and earth is unlocked. Entry cell/MV output circuit in on condition and earth is unlocked. 	VESTAS
3. Ensure that there are no personnel in wind turbines in the line to be energised.	DEVELOPER/VESTAS
4. Close off access roads to the wind turbines.	DEVELOPER/VESTAS
5. In substation, manoeuvre to start up circuit headers cell. Earth is unlocked and in on condition.	DEVELOPER
6. 15 minute wait.	DEVELOPER/VESTAS
7. Visual check for voltage, and confirmation that there are no abnormalities in substation and turbine	DEVELOPER/VESTAS

Once the turbine is energized, a check sheet for the circuit breakers is begun, to confirm correct functioning.

Among these checks is the verification of the TRIP F60 function and the relay for arc detection; these checks require the F60 function to be tripped, and it will be necessary to energise the turbines again. For this kind of posterior energising, do not consider the corresponding waiting times, directly manoeuvring the supply section switch latch for the power transformer in the turbine (F60).

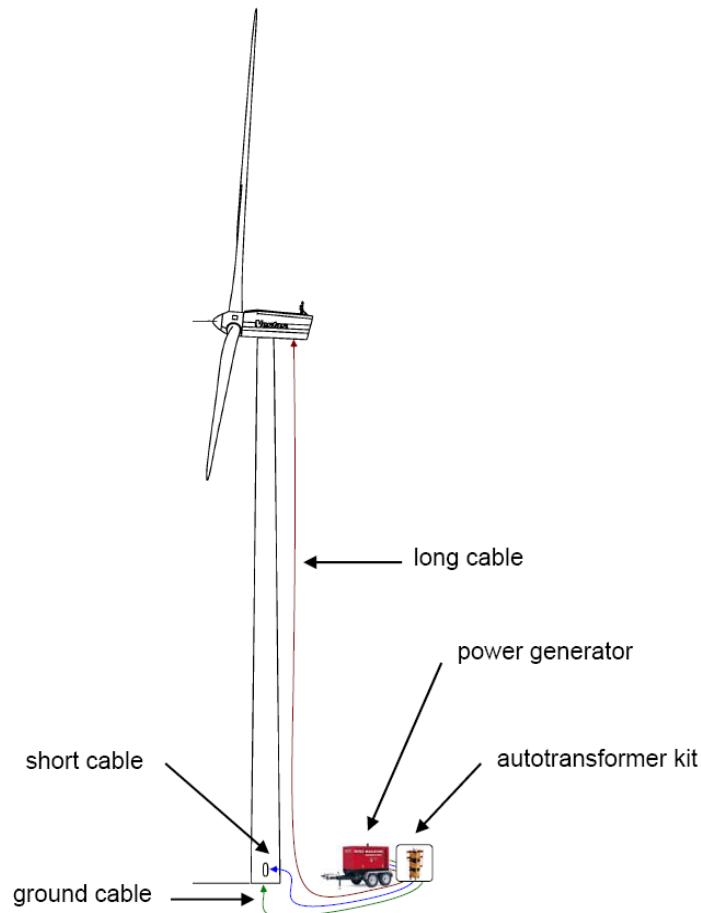
Once the posterior checks and verifications have been completed, point by point, (in accordance with the previously mentioned "Commissioning procedure"), the turbine will be ready to be put in service to begin energy production.

Pre-commissioning

When trying to advance commissioning, and before there is a supply grid in the substation, the checks may be carried out, connecting the turbine to a generator unit with an auto transformer kit which will power all the functions which need to be checked. Hence, the generator unit with the auto transformer kit should be located near the turbine base (ensure that there is enough fuel for the time in that it will be

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used), and connect it to ground control in the bottom platform of the wind turbine and to the Q25 circuit breaker (using a long cable which can reach the nacelle).



19. CONNECTION BETWEEN MACHINES AND SCADA SERVER

To establish communication between the turbines and the substation, and in so doing the VESTAS control centre, an optical fibre circuit should be installed and it will be connected to the server installed in the substation.

Wind turbines are grouped in loops (optical fibre rings), which are inter-connected and finish in a single wire which takes it to the substation area through a work ditch. This ditch also leads the voltage wires to the cell room.

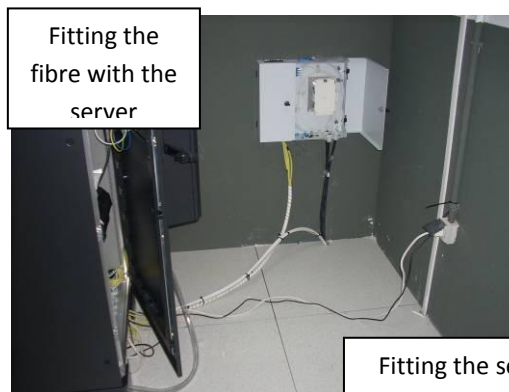
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At the end of the wire a panel called the PATCH PANEL must be attached, next to the server in the substation. This is a small, plastic cabinet attached to the wall, about 50 cm from the ground, which is divided into two compartments. One of these receives the park wire and from the other the fibre fitting goes to the server. This can be attached to the exterior wall of the substation.



Match panel output
sends to server

Input from the end
of the park's fibre
cable



Fitting the server
with the 220 V
supply network

The server is a cabinet which is approximately 80 x 70 cm wide and 190 cm high, the necessary electronic equipment is inside of it. It is transported within protective wood packaging and can be installed in the cell room or another conditioned area in the substation. It is powered by 220 volts, hence there must be low voltage fitting point in the area where it is to be installed.

Also, the server is connected to two parabolic antennae with the fibre cables for the IP connection (internet via satellite) and also to another antenna to synchronise the equipment's time. The antennae are attached to the exterior wall using angled metal mountings.

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Finally, the GRID PANEL is installed with the server, it is a switch board which measures intensity, voltage and continuous power, and it receives power from the cell room. The GRID is fitted with the server with optical fibre (supply network wire).



When all the previously mentioned fittings have been completed, the SCADA technician will connect the machines using the necessary software. If there are any errors the technician must check the measurement cabinet at the turbine to see if the polarity between the fittings is correct or inverted, which could cause the fitting to fail.

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20. EXTERIOR CLEARANCE

On occasions, due to the handling, transport and storage of components, they must be repaired during the same project. The majority of the repairs are in the fibre in the blades and paint touch ups. As mentioned throughout the planning process, the majority of these repairs may be performed when the element to be repaired is stored, as this is the safest way to do so. On occasions these repairs must be performed once the piece has been lifted and assembled, as it is impossible to repair it because it would require personnel to be under suspended loads, or also because of assembly necessities. This requires the use of lifting platforms. These must be approved and large enough to reach the area to be repaired. These platforms are rented from the supply business and should always be handled by authorised individuals, in accordance with the rented model's manufacturer instructions. Hence, the platform leasing company shall guarantee their suitability and good working condition, providing documents which corroborate the corresponding inspections, as well as the qualifications of the operators who drive the cranes. The preventative measures to be taken when using these platforms, and when performing work, are included in the risk evaluation which refers to this safety plan.



HEALTH AND SAFETY PLAN BOP

Module III

Occupational Hazard Management, Safety Operational Control and Legal Requirements

**WIND FARM ENERGÍA EÓLICA DEL SUR- POLÍGONO
JUCHITÁN**

IN JUCHITÁN DE ZARAGOZA, OAXACA, MÉXICO.

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1. PREVENTABLE OCCUPATIONAL RISKS THROUGH TECHNICAL AND ORGANIZATIONAL MEASURES

PREVENTABLE RISKS	TECHNICAL MEASURES TO BE ADOPTED
Stemming from breakage in existing facilities.	Neutralization of existing facilities or posting signs on them, and the presence of the company's Technician at the work site.
Presence of electric lines.	Cutting power, grounding and short-circuiting of the wires.
Collapses when excavating ditches and draining.	Banking, depending on the type of terrain, determined by its geotechnical study.

1.2 THIRD PARTY INJURY RISKS AND PREVENTION

In the following table we analyse the existing risks during construction of the wind farm for unrelated personnel who may enter the area – the parks are located in agricultural lots, and the impossibility of entirely delimiting them can cause interferences with agricultural personnel operating in said terrains – or the transit of pedestrians and vehicles.

RISKS

- People are at risk of being run over or struck, principally due to traffic and the machines which are used in the work being carried out.
- There is a risk of third parties being hit or crushed by vehicles as a consequence of road deterioration due to works, and the presence of unevenness and slopes.
- There is a risk of people falling into ditches, footing or materials related to the construction.

PREVENTATIVE MEASURES AND COLLECTIVE PROTECTION
To protect third parties from possible accidents, the appropriate information and warning signs will be posted in work areas, which will indicate the natural accesses to the construction and prohibit all unauthorised individuals from entering.
The speed limit throughout the premises will be limited to 40 km/h for vans / vehicles and 20 km/h for heavy trucks. It is advisable to place a pertinent sign at every entrance point.

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PREVENTATIVE MEASURES AND COLLECTIVE PROTECTION
If any road or vehicular area may be affected by construction, the necessary diversions must be created with the appropriate warning signs and notices.
The machinery used for construction that is used on public roads must have the obligatory signalling systems, and when necessary, the movement and activities shall be controlled.
Vehicles and lorries used for transportation must protect their cargo with canvas that will prevent land or materials from falling on public roads.
Ditches and footings must be appropriately protected and marked with signs, and all materials must be correctly stored, keeping the work area clean and orderly.
Given the difficulty of completely preventing third parties from entering, due to the park's size, all personnel must be informed of the need to remove any unauthorised people from the site. Unauthorised individuals must be prevented from entering the park area.

1.3 OCCUPATIONAL RISKS WHICH CANNOT BE COMPLETELY ELIMINATED, ORGANISED BY THE STEPS IN WHICH THEY EXIST

The goal of this phase is to evaluate each risk in every step of the construction process which they were indicated in the last section, preventative measures to be applied, and personal protection equipment to be used. The risk evaluation criteria are the severity of the damage which the risk could cause, and the probability that said damage would be caused.

This step is the central theme of preventative action, since it not only requires a risk evaluation definition in terms of importance, but it also introduces preventative measures for each risk.

1.3.1 RISK EVALUATION

An estimate must be created for every detected risk in each of the work steps, and this will determine the potential severity of damage (consequences) and the probability that it may occur. The variables are the damage severity and the probability.

Ratio	Likelihood(L)	Severity (S)
1	Highly improbable	Slight injury treatable with first aid kit (no hours lost).
2	Improbable	Slight injury requiring treatment at healthcare centre (up to three days off work).
3	Possible	Injury or illness requiring attention at a healthcare centre and leading to more than three days off work.
4	Probable	Major injury causing long-term absence or permanent consequences.

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5	Highly probable	Injuries almost certainly causing death.
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To determine the Risk Level, multiply the Probability and Severity ratios and compare them to the following table:

	S	1	2	3	4	5
P						
1		1	2	3	4	5
2		2	4	6	8	10
3		3	6	9	12	15
4		4	8	12	16	20
5		5	10	15	20	25

RISK LEVEL	
1 - 4	Tolerable
5 - 9	Attention needed
10 - 25	Correction needed

Those risks where the Prior Risk Level (PR) is below the dividing line are considered significant risks, and at least one of these two actions must be taken:

1. Creation of a specific safety procedure for the task where the risk is detected.
2. Modification of the existing facility or unit, training or specific supervision to combat the risk.

Once these actions have been completed, the Final Risk Level (FR) will be assessed.

With this, the risk evaluation can be obtained for each of the work steps that have been attached in Appendix I of this Health and Safety Plan; it also reflects the preventative general measures to reduce the risk.

1.4 SPECIAL OCCUPATIONAL RISKS BASED ON APPENDIX II FROM

The following table lists those jobs which, being necessary to continue to work defined in the project in question, imply special risks for the health and safety of the workers:

- Work at height
- Near high voltage electric power lines
- Those which require mounting of heavy, prefabricated elements

1.5 OCCUPATIONAL RISKS OF A SPECIAL NATURE.

The following table shows the work steps in the construction of a wind farm that imply special risks for the health and safety of the workers, and hence minimum health and safety regulations are established for

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construction projects.

Work which creates special risks for the health and safety of workers	Corresponding (including transposition of local laws)	Risk
Loading and unloading material	<ul style="list-style-type: none"> Work which requires assembly or disassembly of heavy, prefabricated elements. 	<ul style="list-style-type: none"> Risk of being crushed between objects or by falling objects Body injuries (cuts, etc)
Assembly of lifting equipment.	<ul style="list-style-type: none"> Work with especially serious risks of fall from height, due to the unique nature of the work being performed, the applied procedures or the work environment. 	<ul style="list-style-type: none"> Fall from height Body injuries (cuts, etc)
	<ul style="list-style-type: none"> Work which requires assembly or disassembly of heavy, prefabricated elements. 	<ul style="list-style-type: none"> Risk of being crushed between objects or by falling objects
Preparation and mounting of the tubular tower	<ul style="list-style-type: none"> Work with especially serious risks of fall from height, due to the unique nature of the work being performed, the applied procedures or the work environment. 	<ul style="list-style-type: none"> Fall from height Body injuries (cuts, etc)
	<ul style="list-style-type: none"> Work which requires assembly or disassembly of heavy, prefabricated elements. 	<ul style="list-style-type: none"> Risk of being crushed between objects or by falling objects Body injuries (cuts, etc)
Installing the hub	<ul style="list-style-type: none"> Work with especially serious risks of fall from height, due to the unique nature of the work being performed, the applied procedures or the work environment. 	<ul style="list-style-type: none"> Fall from height Body injuries (cuts, etc)
	<ul style="list-style-type: none"> Work which requires assembly or disassembly of heavy, prefabricated elements. 	<ul style="list-style-type: none"> Risk of being crushed between objects or by falling objects
Installing the nacelle on the tower	<ul style="list-style-type: none"> Work with especially serious risks of fall from height, due to the unique nature of the work being performed, the applied procedures or the work environment. 	<ul style="list-style-type: none"> Fall from height Body injuries (cuts, etc)
	<ul style="list-style-type: none"> Work which requires assembly or disassembly of heavy, prefabricated elements. 	<ul style="list-style-type: none"> Risk of being crushed between objects or by falling objects Body injuries (cuts, etc)

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Horizontal installation of each of the rotor blades	<ul style="list-style-type: none"> Work with especially serious risks of fall from height, due to the unique nature of the work being performed, the applied procedures or the work environment. 	<ul style="list-style-type: none"> Fall from height Body injuries (cuts, etc)
	<ul style="list-style-type: none"> Work which requires assembly or disassembly of heavy, prefabricated elements. 	<ul style="list-style-type: none"> Risk of being crushed between objects or by falling objects Body injuries (cuts, etc)
Installing the service lifts	<ul style="list-style-type: none"> Work with especially serious risks of fall from height, due to the unique nature of the work being performed, the applied procedures or the work environment. 	<ul style="list-style-type: none"> Fall from height Body injuries (cuts, etc)
	<ul style="list-style-type: none"> Work which requires assembly or disassembly of heavy, prefabricated elements. 	<ul style="list-style-type: none"> Risk of being crushed between objects or by falling objects Body injuries (cuts, etc)
Energization and commissioning	<ul style="list-style-type: none"> Work near high voltage electric power lines. 	<ul style="list-style-type: none"> Electrical contact Fire Explosion
Assembling the tower and accessories on the ground Lifting the tower Assembly/modification of accessories in the hoisted tower	<ul style="list-style-type: none"> Work with especially serious risks of fall from height, due to the unique nature of the work being performed, the applied procedures or the work environment. 	<ul style="list-style-type: none"> Fall from height Body injuries (cuts, etc)
	<ul style="list-style-type: none"> Work which requires assembly or disassembly of heavy, prefabricated elements. 	<ul style="list-style-type: none"> Risk of being crushed between objects or by falling objects Body injuries (cuts, etc)

The following preventative measures must be taken to perform these activities:

- A preventative resource must be present during the time that the risk is taking place, to keep watch and ensure that the preventative activities are being carried out in relation to the risks stemming from the situation which determines their necessity, in order to ensure appropriate control over said risks.
- Specific training regarding risks and preventative measures to be applied during said activities.
- Specifically, those activities that were already indicated in the corresponding section of the risk evaluation included in Appendix I of this Safety Plan.

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2.- SAFETY MANAGEMENT AND CONTROL

2.1 RESPONSIBILITIES

The functional organization of Safety during this project is as follows:

- To create the maximum degree of safety, VESTAS must apply integral safety from the beginning. As a consequence, each worker must ensure that all activities carried out meet all of the perceptual Health and Safety requirements.
- All of work personnel shall receive VESTAS PREVENTION SERVICE advice as well as from each of the subcontractors.
- VESTAS shall take charge of providing each main subcontractor with the part of the plan that relates to their work, and to confirm that the safety measures are met. In every situation. VESTAS may require any of its subcontractors to create their own Safety Plan, in the event that their work procedures differ from those included in this Plan, although VESTAS shall be responsible for the preventative planning for this Plan as well as its final revision.
- In turn, each subcontractor is obligated to and absolutely must, as a previous condition to begin work, formalise the following points:
 - a) Whether or not VESTAS receives it, the Health and Safety Plan adhesion agreement must be signed with this Plan, and it expressly commits individuals to comply completely with the measures included.
 - b) A Representative for health and safety must be named. This person from the subcontractor will be the charge of managing the occupational risk prevention subjects, and will be the direct representative in the contract with the Occupational Risk Prevention Manager from VESTAS and the Health and Safety Coordinator in the execution step.
 - c) One or several Work Implementation Supervisors will be named to monitor "in site" the workers in every subcontracted "unit" or "team", to confirm they are correctly complying with the specifications in the Health and Safety Plan. They will be designated as preventative resources in those situations established by the law of the country.
 - d) In terms of crane supply companies, a manoeuvre leader will be named for different operations, and will have responsibility delegated by VESTAS, to these companies via contract.

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- e) To inform VESTAS, the project management team and the Health and Safety Coordinator, when other companies are subcontracted to perform the work that has been entrusted to them. This contract must always be in accordance with the local legislative requirements that regulate Subcontracting in the construction sector.
- f) In accordance with that set forth in VESTAS internal procedure MED BP 04.06.00, to deliver to VESTAS, the required documentation for the Coordination of Business Activities that guarantees the company's compliance with the Prevention of Occupational Risks Act. Attached to this document there is a list (not comprehensive) of the required documentation.
- g) This documentation, along with that which corresponds to VESTAS working personnel must be made available to the Technicians from specialized bodies relating to occupational health and safety issues from relevant public administrations; and also to the Health and Safety Coordinator during the implementation phase, allowing the necessary measures to be adopted so only authorised individuals may enter the work area.

2.2 IMPLEMENTATION OF THE SAFETY PLAN

Before beginning work, this Health and Safety Plan must be checked to ensure that it is not in conflict with any of the other contractors' Safety Plans due to the measures included at any point. If they are in conflict, both parties must be informed so their respective Plans can be adapted to create the greatest degree of safety. Once there is a safety plan that is in accordance with the work, the guarantee to secure the implementation of the safety plan will be carried out with the following activities:

Information

Before beginning any work, VESTAS must provide, both to its personnel as well as each subcontractor, the section of the Health and Safety Plan which relates the work they will be performing during the project, as well as all its general, overall aspects. The subcontractors shall create a written record of this with the "ADHESION AGREEMENT FOR PREVENTATIVE INFORMATION", wherein they commit to distribute it to all the workers involved in the projects that they have contracted for, and they guarantee compliance with each of the requirements in the Health and Safety Plan. If the work was subcontracted recently (within the limits of local legislation regulating subcontracting), it shall be completed in the same way.

Training

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Additionally, the heads of VESTAS, as well as subcontractors participating in the work, shall obtain the necessary authorisations and permits for their own personnel to operate machinery and perform specific tasks which may create risks for other workers or third parties. They must also inform their employees about the occupational risks and necessary preventative obligations for the safe, correct performance of work before beginning activities. The minimum contents of the training are as follows:

- The workers' health and safety risks while on the job that are referred to in this Health and Safety Plan.
- The applicable protection and prevention measures and activities for the risks indicated in the last section.
- Regulations on the use and control of machinery, equipment and personal protective equipment (PPEs).
- The necessary measures regarding first aid, fire fighting and worker evacuation to be adopted during possible emergency situations. If work must be performed inside the wind turbine, all of the workers must have had on-the-job training for evacuation and rescues from height.

This training will be accredited by delivering the documents that prove the workers were present at the corresponding training sessions indicated in the document appended to this Safety Plan, which contains a list (not comprehensive) of required documentation for employees, according to their risk group.

Surveillance obligations

VESTAS, as the project's main contractor, must oversee compliance with this Health and Safety Plan's orders, both in terms of the work being performed by their own personnel, as well as that of subcontractors and their own subcontractors. Hence, the authorised technicians will provide technical assistance on site until the end of the project. Likewise, this surveillance must be supported during site visits by the project management, installation supervisors, VESTAS technicians and that which was completed by the prevention service.

Individually, each subcontractor will be equally responsible to oversee compliance with this Health and Safety Plan's orders, both in terms of the work being performed by their own personnel, as well as that by their subcontractors and their own subcontractors, and it must be sufficient and suitable for the nature of the jobs being performed.

Appointment of preventative resources

Beyond the previously mentioned surveillance responsibility, and with the goal of confirming the efficiency of the preventative activities established in this Health and Safety Plan, as well as the appropriateness of the activities which the risks stem from, or the appearance of risks that had not been considered and/or those

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derived from situations with special risks, preventative resources shall be assigned when:

- risks may be increased or modified during the performance of the process or activity, due to concurrence of various operations that take place successively or simultaneously and require monitoring of the correct application of work methods.
- when performing activities or processes which are considered dangerous or have special risks, in accordance with the legal requirements of the country.

The obligation to designate preventative resources who will be present at the work centre falls upon each subcontractor who performs these operations or activities, when said preventative resources must collaborate among each other and with the other preventative resources, and person or people in charge of coordinating VESTAS' preventative activities.

These resources must have sufficient authority and the corresponding preventative training (at a minimum, the basic level functions). They must also have necessary resources and there must enough of them to oversee compliance with preventative activities, as they have to stay in the section where said activities or processes are performed until they are concluded.

When, as a result of the surveillance provided by these preventative resources, it is observed that compliance with the preventative activities is deficient:

- The necessary steps shall be taken for correct and immediate compliance with the preventative activities.
- The company must be informed of the situation so that it may adopt the necessary measures to correct the observed deficiencies if these have not already been rectified.

When, as a result of the surveillance, an absence, insufficiency or lack of appropriateness of the preventative measures is observed, the people who are present must inform the business of the circumstances. The business must immediately proceed to adopt the necessary measures to correct the deficiencies and modify the planning of the preventative activity and, when relevant, the evaluation of occupational risks.

Coordination

The Health and Safety Coordinator must carry out the following roles while the work is taking place:

- Coordinate the application of the general principles of prevention and safety:

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1. Make technical and organizational decisions with the goal of planning different projects or work steps that will take place simultaneously or successively.
 2. Estimate the period of time that is necessary to carry out different projects of work steps.
- b. Coordinate work activities to guarantee that the contractors, and when relevant, subcontractors and autonomous workers conform uniformly and responsibly to the principles of preventative action which are listed under the Prevention of Occupational Risks Act while work is being performed, and in particular, during tasks or activities .
 - c. Approve the Health and Safety Plan created by the contractor, and when relevant, any of its modifications.
 - d. Organise the coordination of business activities established in the law related to Prevention of Occupational Risks Act.
 - e. Coordinate the activities and control functions for the correct application of work methods.
 - f. Adopt the necessary measures so that only authorised individuals may enter the work area. The project management team shall take on this role when a coordinator does not need to be designated.

Stopping work

When the Health and Safety Coordinator or any other person involved in project management observes that health and safety measures are not being observed during work, they shall advise the contractor of this, recording the incompliance in a log book. They also have the power, in circumstances of serious or imminent risk to the workers' health and safety, to stop work in the section, and if necessary, the entire project may be stopped. Likewise, this right protects both the worker – when he believes that the activity involves a serious, imminent risk to his life or health – allowing him to stop activity and leave the work area, and it also allows legal representatives to agree to stop the activity of other workers affected by said risk.

Work timetable

The nature of the installation and mounting work in the construction of wind farms requires work to be stopped in situations with adverse meteorological conditions (heavy winds, storms, etc.), in order to comply with safety measures. This can increase the period of time that work is carried out.

This is compounded with the complexity of installing wind turbine elements, which under certain circumstances need to be installed immediately before others to guarantee the stability of the complex or to avoid its

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deterioration.

These factors require an extension of the project's duration, which we try to minimise by extending the work day dedicated to installation, to take advantage of safe meteorological conditions and guarantee the stability of that which is installed.

This extension of the work day for mounting activities may be carried out whenever it does not result in an increase in the work hours stipulated in the Statute of Worker's Rights and/or applicable Agreements with companies.

Hence, each subcontractor must perform the appropriate rotations so that no worker exceeds the established in the

A situation may arise in which working on weekends or with an undetermined timetable goes against that set forth in a Regional Collective Agreement which a particular company is bound by. In these circumstances, the company must:

- Arrange the modification of the workday, with the workers and business, in writing and request said modification from the County Labour Board where the work centre lies and to which the workers are assigned.

If this modification is not accepted, the business may not conduct the work with a timetable which does not comply with the applicable Collective Agreement.

In order to comply, it is recommended that a predicted version of the personnel's time table be completed, this shall include:

- The personnel present on site.
- The rotation (the day and entry and exit time for work, as well as a daily break).

This document will be signed and stamped by each company, and can be used before the Labour Inspection to demonstrate that the project is compliant with current legislation.

2.3 OCCUPATIONAL HYGIENE PLAN – DANGEROUS MATERIALS AND SUBSTANCES

During construction processes, substances and materials may be used that can create health hazards due to intoxication or contact to the individuals who use them or are in an area with them. This is the case with the use of liquid release agents, direct contact with cement or concrete, the use of special mortars (epoxy or similar components) and contact with acids used to clean concrete surfaces.

There may be fire or explosion risks while handling and using certain substances, for example during work that

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requires the use of paints, glues or dissolvents, or with fuel storage areas for machines and the cylinders or canisters for inflammable liquid gases that are used in cutting and welding operations.

Under all circumstances, workers must adhere to instructions recommended by the manufacturer or supplier included in the precepts "Records of safety information for chemical products". During storage and use, the necessary measures must be taken to eliminate or reduce said risks, with a special emphasis on the use of appropriate personal protection resources while performing said operations.

Each business involved in the project must request the Safety Detail Sheets from the suppliers for all the chemical products that will be used, and these must be given to all involved workers, who will be trained in their use.

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SCHEDULE OF CONDITIONS

1.- DEFINITION AND SCOPE OF THE SCHEDULE OF CONDITIONS

Project identification

This schedule of health and safety conditions was created for the Project of the Wind Farm Energía Eólica del Sur- Polígono Juchitán located in Juchitán, Oaxaca, México.

Compatibility and relationship between said documents

All of the documents contained in this Health and Safety Plan are compatible; all documents complement each other, creating an inseparable whole that must be adhered to while work is being carried out.

Objectives

This schedule of technical and individual health and safety conditions is a contractual document for this project, and was designed to summarise the legal norms to be applied in terms of the prevention of occupational risks to which it is applied, and it also creates some specific quality levels for all of the prevention which must be carried out, in order to guarantee successful application.

This was done with the global objective of completing this project without incurring any accidents or professional illnesses, by complying with the objectives established in the health and safety report. This report was not included in this document in order to minimise space, but is understood to be transcribed to the fundamental norms of this document.

2. SUMMARY OF LEGAL NORMS TO BE APPLIED TO PREVENT OCCUPATIONAL

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RISKS

Ley Federal del Trabajo D.O.F. 01/04/1970 y sus reformas.

- Reglamento Federal de Seguridad, Higiene y Medio Ambiente de Trabajo D.O.F. 28-I-1997.
- NOM-001-STPS-2008, Edificios, locales, instalaciones y áreas en los centros de trabajo - Condiciones de seguridad. D.O.F. 24-XI-2008.
- NOM-002-STPS-2000, Condiciones de seguridad - Prevención, protección y combate de incendios en los centros de trabajo. D.O.F. 8-IX-2000. (aclaración D.O.F. 2-I-2001).
- NOM-004-STPS-1999, Sistemas de protección y dispositivos de seguridad de la maquinaria y equipo que se utilice en los centros de trabajo. D.O.F. 31-V-1999. (aclaración D.O.F. 16-VII-1999).
- NOM-005-STPS-1998, Relativa a las condiciones de seguridad e higiene en los centros de trabajo para el manejo, transporte y almacenamiento de sustancias químicas peligrosas. D.O.F. 2-II-1999.
- NOM-006-STPS-2000, Manejo y almacenamiento de materiales - Condiciones y procedimientos de seguridad. D.O.F. 9-III-2001.
- NOM-009-STPS-2011 Condiciones para realizar trabajos en altura.
- NOM-010-STPS-1999, Condiciones de seguridad e higiene en los centros de trabajo donde se manejen, transporten, procesen o almacenen sustancias químicas capaces de generar contaminación en el medio ambiente laboral. D.O.F. 13-III-2000. (aclaración y fe de erratas D.O.F. 21-VIII-2000).
- NOM-011-STPS-2001, Condiciones de seguridad e higiene en los centros de trabajo donde se genere ruido. D.O.F. 17-IV-2002.
- NOM-017-STPS-2008, Equipo de protección personal - Selección, uso y manejo en los centros de trabajo. D.O.F. 9-XII-2008.
- NOM-018-STPS-2000, Sistema para la identificación y comunicación de peligros y riesgos por sustancias químicas peligrosas en los centros de trabajo. D.O.F. 27-X-2000. (aclaración

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D.O.F. 2-I-2001).

- NOM-019-STPS-2004, Constitución, organización y funcionamiento de las comisiones de seguridad e higiene en los centros de trabajo. D.O.F. 4-I-2005.
- NOM-020-STPS-2011, Recipientes sujetos a presión y calderas - Funcionamiento- Condiciones de seguridad. D.O.F. 28-VIII-2002.
- NOM-021-STPS-1993, Relativa a los requerimientos y características de los informes de los riesgos de trabajo que ocurran, para integrar las estadísticas. D.O.F. 24-V-1994. (aclaración D.O.F. 8-VI-94).
- NOM-025-STPS-2008, Condiciones de iluminación en los centros de trabajo. D.O.F. 20- XII-2008.
- NOM-026-STPS-2008, Colores y señales de seguridad e higiene, e identificación de riesgos por fluidos conducidos en tuberías. D.O.F. 25-XI-2008.
- NOM-027-STPS-2008, Actividades de soldadura y corte - Condiciones de seguridad e higiene. D.O.F. 7-XI-2008.
- NOM-029-STPS-2005, Mantenimiento de las instalaciones eléctricas en los centros de trabajo - Condiciones de seguridad. D.O.F. 31-V-2005.
- NOM-001-SEDE-1999, "Instalaciones eléctricas (utilización)"
- NOM-030-STPS-2006, Servicios preventivos de seguridad y salud en el trabajo- Organización y funciones. D.O.F. 29-IX-2006.
- NOM-031-STPS-2011 Construcción condiciones de Seguridad t Salud en el trabajo.
- NOM-113-STPS-1994, Calzado de protección. D.O.F. 22-I-1996.
- Acuerdo que modifica la Norma Oficial Mexicana NOM-113-STPS-1994, Calzado de Protección. D.O.F. 17-XI-1999. (Aclaración D.O.F. 20-XII-1999).
- NOM-115-STPS-1994, Cascos de protección - Especificaciones, métodos de prueba y clasificación. D.O.F. 31-I-1996.
- Acuerdo que modifica la Norma Oficial Mexicana NOM-115-STPS-1994, Cascos de

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protección - Especificaciones, métodos de prueba y clasificación. D.O.F. 16-XI-1999. (aclaración D.O.F. 7-VII-2000).

- NOM-116-STPS-1994, Seguridad - Respiradores y purificadores de aire contra partículas nocivas. D.O.F. 1-II-1996

3. CHARACTERISTICS OF SAFETY ELEMENTS AND MATERIALS

COLLECTIVE PROTECTIONS

Next, we describe the different application methods for the collective protection that VESTAS has established in its workplaces which in essence, quality, mission and efficacy, are adjusted to the technical characteristics and preventative philosophy regarding the Health and Safety Study.

- AUTONOMOUS FENCING FOR LIMITATION AND PROTECTION

They will be a minimum of 100 cm. They will be made of metal baluster with clamps or points with supports for the tubular metal or wood handrails.

- MARKING OFF AREAS

Red and white marking tape shall be used to mark off work areas like ditches, pits, etc.

- CABLES AND ELEMENTS FOR SHACKLING THE SAFETY HARNESS AND ITS ANCHORS

All elements must be strong enough to support the forces which they may be exposed to, so they can be used for effective protection. They must be perfectly preserved, and they shall be periodically inspected by the users to ensure that they are in perfect condition.

- FIRE EXTINGUISHERS

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A class 89 B dry powder extinguisher as a minimum category shall be kept in the work huts. In the nacelles, there must also be a class 55 B carbon dioxide extinguisher. They must both be revised annually by authorised personnel.

- WORK SURFACES AND MOVEMENT

They will be a minimum of 60 cm wide, and those which are positioned higher than 2 m will have a hand rail that is 90 cm high, an intermediate bar and a skirting board. If, due to design restrictions, they are not present, the appropriate fall arrest system shall be used.

- OPEN AREA FOR UNLOADING VEHICLES TO DIFFERENT LEVELS

This can be carried out with support planks that are attached to the ground with, or with another effective technique.

PERSONAL PROTECTION

During the distinct steps and operations in the project, the following Personal Protection Equipment (PPEs), which have been approved by the Ministry of Labour, must be used.

- HEAD PROTECTION

* Safety Helmet During all the steps in the project, and for all participating personnel.

- EYE PROTECTION

* Welding safety glasses when performing flame cutting.

* Panoramic, adjustable stone cutting glasses with elasticized rubber: for work involving hammering, irrigating, building, laying concrete, and in general, environments that contain soil and dust.

- HEARING PROTECTION

* Hearing Protector made of Class C sponge earplugs for irregular work near compressors, jackhammers, and machinery used to move and compact land.

* Noise Blocking Ear Muffs: Used for the previously described works, when the workers are regularly or

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permanently exposed to the noise.

- RESPIRATORY PROTECTION

* Disposable self-filtering cellulose mask: For irregular work around dust created by concrete laying, gunite spraying machines, and machines for drilling or splitting.

* Filtered breathing mask with replaceable, built-in filters: Used for the previously described works, when the workers are regularly or permanently exposed to dust or physical, chemical or biological contaminants.

- HAND PROTECTION

* Leather, canvas or latex gloves: For projects which require the handling of manual tools and manual support of objects and loads.

* Anti-vibration Gloves: For work in which the individual must handle vibrating machinery like pneumatic picks and rollers, or manual vibrating shovels.

- FOOT PROTECTION

* Safety footwear with toes and with or without a metal insole to protect feet against blows and punctures: For all types of work, especially those with shuttering and structures and the bearing of loads.

* Metal lined nail-proof insoles: To be used in safety footwear, in shoes that do not have them, for the project steps and work which present a hazard of punctures (steel fixing, carpentry, etc.).

* Waterproof, moisture proof boots with built-in steel toe: For work near moisture which presents a risk of becoming trapped, objects falling on feet, and punctures (i.e. concrete slabs).

- FALL ARREST

The fall arrest shall be complied with the “The building Operations and Works of Engineering Construction (Safety, Health and Welfare) Regulations”, *PART II : Safety of Working Places and Means of Access and Egress, No. 33 Prevention of falls and provision of safety nets and belts.*

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- * Safety Harness: produced in accordance with EN 361.
- * Anchor Cable with Shock Absorber: produced in accordance with EN 355.
- * Positioning cables: produced in accordance with EN 358.
- * Sliding fall arrester with a self-acting block for the safety line: EN 353-1, 353-2.

- **WORK GARMENTS**

*Work Overalls (construction). All weather (winter/summer): For regular projects with Civil Work and Building.

* Work Raincoat. Seamless water suit, jacket and trousers: Work raincoat common for irregular work in light rain.

* Reflective Public Work Jacket. Made of mesh with hoops of reflective material:

These must be used throughout the work area, due to the presence of heavy machinery and suspended loads, as well as for regular work near roads.

* Long, Signal-San Style Jacket. Made of orange, waterproof nylon with reflective strips on the chest, back, cuffs and waist: For work in which the worker's presence must be highlighted, and in cold environments in general for managers and personnel who may require it, due to the excessive climatic conditions. Predicted duration under normal conditions: 2 seasons. Do not use near sparks.

HEALTH AND SAFETY PLAN BOP

Module IV

Risk Assessment for Supply and Assembly of Wind Turbines

**WIND FARM ENERGÍA EÓLICA DEL SUR- POLÍGONO
JUCHITÁN**

IN JUCHITÁN DE ZARAGOZA, OAXACA, MÉXICO.

Applicable to turbine modules : V80, V90 ,V100, V110 and V112			
Applicable instructions or safety documents:			
Prepared by: JAPGO	Approved by: LACTA	Approved at: ACAMPO ARIAS	Valid from 30/10/012 until work is complete

The Risk Level (**R**) is obtained by multiplying the ratios of Likelihood(**L**) and Severity (**S**):

Ratio	Likelihood (L)	Severity (S)
1	Very improbable:	Slight injury treated with first aid kit (no hours lost).
2	Improbable	Slight injury requiring hospital attention (up to three days off work).
3	Possible	Injury or illness requiring hospital care resulting in more than three days off work.
4	Probable	Serious injury with long-term absence or permanent effects.
5	Very probable	Injuries most likely leading to death.

L\S	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25


R	<u>RISK LEVEL</u>
1 - 2	Trivial
3 - 6	Acceptable
8 - 10	Moderate
12 - 16	High
20 - 25	Unacceptable

The risks where prior Risk Level (R) is below the dividing line, or where the L or A boxes are marked, are considered a significant risk and one of these two actions should be taken:


1. Create a specific safety procedure for the task involving the risk.
2. Modify the existing installation or equipment, specific training or supervision for mitigating the danger.

Having carried out these actions, the final Risk Level will be assessed (R).

Rev. no.	Description of changes with regard to previous version
REV 02	Amendment in blade assembly RA. Addition of the following activities: <ul style="list-style-type: none"> • Outside repair tasks with elevator platform • Installation of SCADA system • Start-up, Commissioning and Pre-commissioning
REV 03	Amendment in use of generating set activity RA Remove FR007 as coordination of business activities tool Use of mobile phone is prohibited while operating cranes and other vehicles
REV 04	Preventive measures for tasks performed at night are added Preventive measures are added for risks resulting from cold and heat, rain, snow. A new assessed activity is added: Distribution and repair of the site


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REV 05	<p>The use of an anti-fall device is included for bolt tightening tasks in the elevator shaft</p> <p>The possible appearance of unexploded war artifacts from the War is included</p> <p>Further information is given on preventive measures during crane assembly, in reference to the risk of falling from heights.</p> <p>Further information is given on preventive measures during the use of the service crane.</p> <p>Inspection of the support or frame elements used in stockpiling materials (polystyrene blocks, wood crossbeams...) is added as a preventive measure.</p> <p>The prohibition to stand on the foundation ring during assembly of the first section is added, performing the assembly from the outside.</p> <p>The need to have the ladder pre-assembled in order to be installed when the first section is assembled is included.</p> <p>Measures are implemented for placing the nose on the cone, avoiding standing under the hanging load.</p>
	<p>Preventive measures for power cable assembly are included.</p> <p>New preventive measures for access to the nacelle piled on the ground are included, adding the use of an anti-fall device.</p> <p>Preventive measures are added for rotor locking tasks with 0 wind</p> <p>Preventive measures are included for tasks requiring work in the vicinity of the connection star of the gearbox after the blades are installed.</p>
	<p>REV 06</p> <p>The compulsory use of safety footwear is changed to safety boots</p> <p>New preventive measures are included for the assembly of the hub on the nacelle.</p>
	<p>REV 07</p> <p>New preventive measures are included for the use of telescopic handlers.</p> <p>REV 08</p> <p>The preventive measures are increased for the use of telescopic handlers.</p> <p>New preventive measures are included for loading and unloading nacelles with base plates.</p> <p>The preventive measures on the use of turbine service cranes are increased.</p>


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REV.09	<p>New preventive measures are included about the obligation of the crane operator will remain in the cabin during the lifting or have a suspended load in the crane.</p> <p>Crane cabin evacuation if the ladder is blocked.</p>
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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
Work area/ Site	No supervision of safety of the work	Deviation from safety procedures and rules	3	5	15	Due to the special hazard conditions involved in all the turbine installation operations, the subcontracted company performing the tasks shall assign a preventive technician to each job team, who shall be present, supervising to ensure that the general safety measures, the risk assessments and work instructions are complied with.	1	2	2
	Vehicle traffic and third parties.	Personal injuries to third parties due to falling objects, crashes, becoming trapped....	3	4	12	Monitoring of staff on the ground to keep unauthorized individuals out of the site. Unauthorized individuals shall not be allowed to approach within 100 meters from the site. Signs must be placed at all the entrances to the site warning about the hazards, and the entrance of individuals not involved in the work is prohibited.	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
	Falling equipment and tools.	Personal injuries due to falling objects	3	4	12	Keep individuals not involved in the operations out of their range of action. At no time must staff stand under hanging loads, except in familiar, controlled operations. All staff members must use safety helmets and boots to avoid damage from falling tools or loose parts. Use safety bags and containers to lift tools. Use appropriate hoisting equipment in perfect conditions for the weight to be lifted (check its condition before using), and perform periodic operational controls of this equipment.	1	2	2
	Access to the site via mountainous areas.	Driving accidents.	4	4	16	Be particularly cautious. Turn on lights. Use vehicles that are appropriate for the road conditions (4x4). Follow specific traffic signs and rules when driving. Place signs in black spots where there is a danger of falling due to uneven ground.	1	4	4
	Livestock or other farm animals on the site.	Bites, stings. Driving accidents. Running over animals	3	1	3	Keep animals out of the site. Have insect repellent available during seasons or periods when they are likely to exist. Have medication available for bites and stings. Drive with caution and follow the site's traffic signs and rules.	1	1	1
	Consumption of alcohol, medication with drowsiness and/or vertigo side effects and mind-altering substances.	Falls Knocks Dizziness Vertigo	2	5	10	Access to wind turbines, weather stations, cranes or platforms shall not be allowed to individuals under the effect of alcohol, drugs or medications that cause drowsiness or vertigo. Therefore, consumption of such substances before or during the execution of the work, even during meals, is prohibited.	1	5	5

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
	Uneven surfaces Wind turbine access ladders	Same-level falls	3	3	9	Notify the farm developer of defects in roads and flat areas for adaptation thereof. Use handrails on stairs Take special care to watch where one is stepping Avoid running. Place signs and/or protect any areas that have temporary uneven or irregular ground.	2	2	4
	Rigid elements, structures, small spaces	Blows, cuts on the head	3	3	15	Take special care when walking in the assembly area. Special attention must be paid to zones in which cranes operate, heavy elements are transported and within the wind turbine Use a helmet throughout the area and inside the wind turbine.	1	3	3
	Manual handling of loads	Thoracic and lumbar injuries	4	3	12	The maximum weight to be handled manually must not exceed 25 kg. Occasionally, practiced workers can lift up to 40 kg. Bend at the knees when lifting loads. Avoid turning your spine when handling loads. Try to hold the load tightly. Use mechanical means for handling the load whenever possible.	2	2	4
	Emergency situations	Late assistance in emergencies Inappropriate first aid action	2	5	10	There should be a minimum of two qualified workers with both theoretical and practical rescue, evacuation, first aid and fire-fighting training when work is done inside the turbine. When performing any kind of work at great heights, there shall be a rescue and evacuation team available. Extinguishing equipment with a fire rating of 89B must be available in vehicles, turbines and work site containers. Periodic inspection of extinguishing equipment Employee training on emergency plan A first aid kit will be available. There will be at least one mobile telephone operational on the work site. Building fires on the farm is prohibited. Smoking inside the turbines is prohibited	2	3	6

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
	Possible appearance of unexploded war artifacts from the War	Explosion	2	5	10	<p>If the presence of a war artifact is detected, the actions taken shall be as follows:</p> <ul style="list-style-type: none"> Work must be stopped immediately in the area where the artifact was detected, an appropriate safety perimeter shall be signaled and entry into this area shall not be allowed. The Installation Supervisor shall be notified, who shall inform the Health and Safety Coordinator. The Installation Supervisor shall notify the police so that they can remove or deactivate the war artifact. <p>Handling any war artifact or resuming work before the police has certified the absence of any risk is strictly forbidden.</p>	1	5	5
Weather conditions.	Extreme weather conditions. Storms High or gusting winds	Miscellaneous personal injuries caused by lightening, sudden movements of the turbine Origin of emergency situations Others...	3	2	6	<p>Check meteorological conditions before carrying out any work.</p> <p>No work shall be performed on the wind farm, nor shall anyone remain there, in extreme weather conditions.</p> <p>In the event of an electrical storm, no one must remain in the wind turbine or on the wind farm.</p> <p>When the storm has finished, at least 1 hour must elapse before returning to the wind turbines.</p> <p>The indications regarding the wind limit during the different installation phases must be kept in mind.</p>	1	2	2
	Presence of ice on the wind turbine in winter periods	Serious injuries.	2	3	6	<p>If there is snow or ice on the wind turbine, the instructions specified in RULE "Identification of risks due to ice and snow" shall be followed</p>	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
	Cold and heat, rain, snow	Adverse environmental conditions (extreme temperatures)	4	4	16	Wear appropriate clothes depending on the weather conditions and the pertinent protection equipment (waterproof suits...) In order to avoid the damaging effects of direct exposure to the sun, it is recommended that sunscreen be used when working outdoors, avoiding contact with eyes and mucous membranes.	2	2	4

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
		Cramps, fainting from heat, dehydration, heat exhaustion and heatstroke in summer months.	3	5	15	<p>Schedule the work to be done so as to reduce exposure to the sun, endeavoring to perform the tasks that require the greatest effort or that are performed in unsheltered areas and in full sunlight during the early hours of the day.</p> <p>During the working day, water with salts must be consumed (available in the first aid kit) in small amounts, around 100 to 150 ml. every 15-20 minutes, without waiting to feel thirsty. Whenever possible, the temperature of the water with salts should be between 9 and 12°C. Avoid consumption of stimulating beverages, especially those containing caffeine, as they increase urine excretion.</p> <p>Large, heavy meals must be avoided, and the consumption of high fat foods should be reduced. Appropriate consumption of salt with meals.</p> <p>During the period of acclimatization to the heat, additional consumption of salt.</p> <p>While work is being performed, tasks requiring great physical efforts shall be alternated with tasks requiring little physical effort.</p> <p>Newly hired workers, those who normally work in more temperate zones but are transferred to hot climates or those who work in hot climates but have been absent from work for more than 15 days, must undergo an acclimatization program. Such acclimatization program shall consist of working only half a day on the first day of work in the wind turbine, progressively increasing the work time by 10% of the normal working hours each day, until a full day is reached.</p> <p>Break periods must be taken after performing tasks that require making great physical efforts. These breaks shall last 20 minutes for each hour of work requiring great physical effort done between 12:00 AM and 07:00 PM. (40 minutes of work on tasks requiring a very high metabolic consumption and 20 minutes of break).</p>	1	5	5

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
Worker qualifications Knowledge of the documentation	Lack of information/training	Serious injuries due to lack of knowledge about the risk Serious material damages.	3	5	15	All workers must receive training on all the aspects applicable to them that are included in this health and safety plan, in the specific safety manuals of the machine attached herein, in the specific installation instructions and in this risk assessment. Giving a detailed prior explanation of the operations to technicians is recommended, highlighting the risks of each task before starting it. Request training certificates that verify the workers' qualifications.	1	2	2
Worker qualifications High-rise works	Lack of knowledge about working at heights.	Very serious personal risks due to lack of knowledge about the risk and the preventive measures to be taken.	4	5	20	Staff working in the wind turbines must receive specific training on working at heights. If this training is not available, access shall only be allowed under the supervision of two full-time technicians who have received such training and have given a talk on safety first.	1	2	2
	Lack of knowledge about rescue and evacuation tasks in turbines.	Very serious personal risks due to inappropriate action taken in the event of an emergency	3	5	15	When work is done inside the turbine, at least two employees holding valid training certificates in evacuation and rescue from heights must be present. A rescue team must always be present when performing work in the wind turbine.	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
Personal Protective Equipment	Inappropriate use of Personal Protective Equipment	Knocks Cuts. Falls Entrapment Projections	4	5	20	Compulsory personal protective equipment throughout the work site: - Safety helmet with chin straps - Safety boots - Mechanical protective gloves - Reflective jacket When work is done at heights, a fall prevention system must be available, composed of: - Fall arrest harness - 2 lanyards with energy absorber and wide opening hooks (max. 1.5 m in length) - Positioning rope - Automatic lock sliding device of lifeline installed in the ladder for its lifting Any others referred to in the various chapters of the assessment for each case. Before starting the work, the user must inspect the safety equipment. Equipment in poor condition must be replaced.	1	3	3
Chemical products and other substances.	Handling chemical substances	Personal injuries due to intoxication, sensitization, burns, and so on.	2	4	8	Read the instructions for use on the safety labels of the products. Use the required personal protection items: appropriate chemical protection gloves, masks and safety goggles. Appropriate clothing must be worn at all times.	1	3	3
Night work	Low lighting conditions.	Personal injuries and material damages.	3	4	12	When work is performed at night, the site must be adequately lit in order to work safely. This lighting must never be less than 200 lux in assembly areas and 50 in transit areas. The tasks must be scheduled so that the required resources indicated are available and the work is properly prepared in accordance with the appendix to the Health and Safety Plan referred to in this risk assessment. The job manager, the technicians answering to such party and the crane operator must be in contact by radio at all times.	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
	Failure to adapt psycho-socially to working night shifts	Deriving from psycho-social factors	3	3	9	<p>At no time shall an extension of the duration of the work during a single working day lead to an extension of the workers' shift beyond the time established in the regulations in force (workers' statutes, collective bargaining agreements, etc.). In addition, between the end of one shift and the start of the next one there must be at least twelve hours, and the staff must rotate.</p> <p>Regarding the organization of the work, it is recommended that shifts be chosen with the interested parties' participation and, where applicable, that of the Risk Prevention Delegates or the Safety and Health Committee.</p> <p>Workers that best adapt to the night shift shall be chosen. Workers shall be given the option to participate in establishing the different teams. An attempt shall be made to keep the same members of a team in order to facilitate stable personal relations.</p> <p>The workload shall be reduced at night, since a greater effort is needed to achieve the same results as work done during the day.</p> <p>After two or three consecutive night shifts, at least one full day of rest shall be given.</p> <p>All the shift organizing must plan for free weekends of at least two consecutive days.</p> <p>Hot, balanced meals shall be offered, and appropriate spaces for heating food shall be installed, planning enough time for eating and taking the appropriate breaks.</p>	1	3	3
Working alone	Isolation.	Late assistance in emergencies	2	5	10	<p>Works at turbines must be executed in teams of at least two workers.</p> <p>Working alone is prohibited.</p>	2	3	6

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
Tools	Inappropriate use of tools or use of tools in poor condition	Miscellaneous	3	2	6	All the tools must have an EC mark, be in good conditions and be regularly examined. Before using them, verify that all the tools are in correct working order. Use protective equipment appropriate to the tool to be used. Select proper tools. Use machines and tools as indicated in the relevant manuals. Do not lock or remove safety devices	2	2	4
Work with electrical tightening tools	Use of electrical tightening tools: <ul style="list-style-type: none"> Electricity Moving parts Falling of loose objects Noise 	Entrapment Electric shock Noise	2	3	6	Carry out a previous visual inspection. The following specific protective equipment shall be used for this task: <ul style="list-style-type: none"> mechanical protective gloves use hearing protection wear protective goggles Hydraulic wrench and Makita tool sockets must be fastened with available locking pins to avoid potential falls or projections.	1	2	2
Working with hydraulic tools	High oil pressure Moving parts Noise	Injuries due to oil sprayed at high pressure and resulting from the harmful effects of inhalation or ingestion of or contact with oil. Entrapment between movable objects. Contact with oil	3	4	12	Regarding tools, check the inspection label of the wrench, hoses and pump to ensure that they have been duly inspected. A visual inspection must be carried out before using the tools. The following specific protective equipment shall be used for this task: <ul style="list-style-type: none"> mechanical protective gloves use hearing protection wear protective goggles Hydraulic wrench placement and operation of the service box will be carried out preferably by the same person. Exceptionally, in the event that two workers participate in the operation, they must agree beforehand on the verbal orders to be used. The worker operating the service box must always keep eye contact with the tightening area.	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
Working on hydraulic systems	High oil pressure Moving parts Noise	Injuries due to oil sprayed at high pressure and resulting from the harmful effects of inhalation or ingestion of or contact with oil. Entrapment between movable objects. Contact with oil	3	4	12	Work must never be done while the hydraulic system is pressurized. Check whether there is pressure in the hydraulic system before performing any work. No connections should be installed or uninstalled while the hydraulic system is pressurized. Lock the hydraulic system to prevent it from accidentally starting up while work is being done on it. The following specific protective equipment shall be used for this task: <ul style="list-style-type: none"> mechanical protective gloves wear protective goggles 	1	2	2
Driving	Driving of vehicles	Driving Accidents.	3	4	12	Observe maximum speeds on traffic roads. Speeds must never exceed 40 Km/h inside the site Observe the speed limit when driving on public roads. Do not use mobile phones while driving. Take periodic breaks during long trips. Make sure you have the appropriate permit to drive the relevant vehicle	2	3	6
Use of generating sets	Temporary electrical installation	Very serious injuries due to electric shock	3	4	12	Follow the manufacturer's instructions for use of the generating set and do not handle the connections. Connect the generating set to the wind turbine grid using standard CETAC-type sockets. Verify that they bear CE marking and are in perfect working order. Connect the grounding before use Keep the set in a clean, dry place sheltered from bad weather, and in a place where it cannot be used by unauthorized parties. Do not turn the machine over. Do not leave the engine running on the generating set when the work is finished	1	4	4

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
	Ignition of fuel	Burns	3	4	12	When refueling the assembly, always do so in well-ventilated areas with the engine powered off and cold and the fuel cock closed. Do not smoke during this operation. Do not overfill the tank and tighten the plug once done A funnel must be used to pour the fuel into the tank to prevent unnecessary spillage. If fuel is spilled, do not start the engine until after the spilled liquid has been completely cleaned and dried.	1	4	4
	Noise	Hearing injuries	3	3	9	Place the generating set far enough away from the work area. Use earmuffs if this is not possible.	1	1	1


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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
Use of crane for hoisting loads	Shifting loads Falling material Breakage of hoisting elements and falling load	Blows to, collisions with, entrapment of, knocking down workers	3	4	12	Perform a prior visual inspection thereof before use and verification of its operating capacity, checking that all the commands function correctly. Check that the crane hook has the safety lock and that it is in correct condition. At all times, observe the crane's maximum load capacity. Use approved hoisting bags and elements appropriate to the material being hoisted, visually inspecting them before use and always observing the load capacity thereof. Hoisting bags must always be used with a rigid sheet (wood, plastic, etc.) at the bottom. The material placed in the lifting bags must not stick out of the bags, which must be closed at the top using the system in place on the bags. When attaching the lifting bags and accessories to the crane hook, the safety lock must be checked to ensure it locks correctly, which may not occur if too many lifting accessories are placed on the hook. The lifting crane shall not be used when there is an average wind speed of 15 m/s over ten minutes. Workers on the ground must use a safety helmet and must not stand beneath the crane trapdoor when it is open. At all times they must maintain a safe distance with the footprint of the trapdoor, refraining from entering this area until the crane hook is on the ground and leaving it as soon as the lifting bags and accessories are attached. Under no circumstances shall anyone remain under loads lifted by the crane. Do not park vehicles under the nacelle or the rotor.	2	2	4

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Action to Reduce the Risk	L	S	R
	Proximity to the crane shaft for raising and lowering material.	Falling to another level through the crane trapdoor	3	5	15	<p>Before opening the crane trapdoor to lift the materials and tools to the nacelle, all the workers near the crane trapdoor must be attached with one of the lanyards equipped with absorbers in the individual fall protection system to one of the approved anchorage points on the nacelle, remaining anchored there until the crane trapdoor has closed. Keep the safety chain in place while the materials and tools are being lifted.</p> <p>For simultaneously lifting several bags with the crane, multiple hooks (clamps) will be used. The central ring of the clamp shall be connected to the crane hook, and no other element can be placed on this crane hook.</p> <p>All the bags shall be connected to the clamp hooks, and just one bag per hook. If the clamp hooks are insufficient, bags CANNOT be connected to the crane hook; instead a subsequent lifting task must be performed.</p> <p>If a tag line (guy) must be connected, it CANNOT be connected to the crane hook, but must be connected to the central clamp ring instead.</p> <p>The rescue equipment that must be lifted shall be inserted in the hoisting bag, and it cannot be connected directly to the hooks.</p>	1	5	5
	Multiple hooks for lifting loads with the crane (clamps)	Dropping the hoisted material							
	Shifting of the crane chain.	Entrapment of hands between the chain and the entrance of such to the crane.	2	4	8	Hands and other body parts must not be placed near the crane entrance to the crane.	1	4	4

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• **SPECIFIC OPERATIONS RISKS.**


Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Distribution and repair of the site	Irregular or poorly compacted surfaces Limited space	Same-level falls, tripping. Stockpiled load overturned and crane tipping over due to unstable ground.	3	5	15	<p>Carefully plan the dimensions of the flat area with the crane supplier company, the crane position on the flat area and the stockpiling of wind turbine components relating to the concrete foundations in order to ensure safety and efficiency during the work on the site.</p> <p>The wind turbine assembly platforms must meet the requirements indicated in the VESTAS "Civil Engineering Specifications". otherwise:</p> <ul style="list-style-type: none"> • Notify the farm developer of defects in roads and flat areas for adaptation thereof. • Take special care to watch where one is stepping • Avoid running. • Place signs and/or protect any areas that have temporary uneven or irregular ground. <p>Exceptionally, earthworks may be done, using a telescopic handler with the appropriate tool attachment (loader), when the ground has not been properly leveled or has been altered by bad weather conditions.</p> <p>Perform monitoring as per the instruction MED INS 30.11.01 Safety Requirements for Hoisting Components, filling in the form FR 149 Hoisting Plan.</p>	1	5	5

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Inappropriate use of the telescopic handler in site repair tasks	Damages caused by traffic accidents, overturned loads, overturned equipment.	3	3	9	<p>The telescopic handler can only be used by qualified personnel; in other words, individuals who have received specific training on operating these types of equipment. This fact must be guaranteed by delivering the documents that prove the qualifications of the operators driving such equipment, in accordance with Vestas procedure MED BP 04.06.00 Coordination of activities with subcontracted companies.</p> <p>The certificate showing that the relevant check-ups are up-to-date shall be requested from the supplier.</p> <p>The handler shall be adapted for carrying out earthworks by attaching a loader approved for the machine model used, according to the manufacturer's instructions.</p> <p>The maximum speed at which the telescopic handler can move shall be 20 Km/h on the farm. It shall comply with the established limits on public roads.</p> <p>The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin.</p> <p>Transporting operators on the vehicle and in the vehicle's interior is prohibited.</p> <p>The use of mobile telephones is not allowed while driving the vehicle.</p>	2	2	4

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Transportation of material: Transport Vehicles	Traffic accidents Overturned loads	Damages caused by traffic accidents, overturned loads Damages to third parties	3	4	12	<p>Transport companies shall request the relevant permits in order to travel on public roads (road map, etc.).</p> <p>The transport companies must be qualified to drive transport vehicles, and the vehicles must have passed the relevant inspections. At the entrance to the site, they shall be informed of the risks, preventive measures and emergency guidelines through delivery of the “Rules of Access to Wind Farms”.</p> <p>The transport companies shall use escort vehicles as required according to the load conditions and the public road, up to the stockpiling zone.</p> <p>Carriers must not exceed the established number of driving hours or timetables.</p> <p>The carriers of main components and cranes must not surpass the speed of 20 Km/h in the farm. It shall comply with the established limits on public roads.</p> <p>Other transport vehicles shall be governed by the speed limit established in the farm (40 Km/h).</p> <p>Carriers who step out of the cabin on the work site must use safety helmets and boots and a reflective vest.</p>	1	1	1

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Transportation of material: Telescopic handler	Inappropriate use of the telescopic handler	Damages caused by traffic accidents, overturned loads, overturned equipment, falls, crashes	3	4	12	<p>The telescopic handler can only be used by qualified personnel; in other words, individuals who have received specific training on operating these types of equipment. This fact must be guaranteed by delivering the documents that prove the qualifications of the operators driving such equipment, in accordance with Vestas procedure MED BP 04.06.00 Coordination of activities with subcontracted companies. The certificate showing that the relevant check-ups are up-to-date shall be requested from the supplier.</p> <p>Operators shall not carry loads with a weight surpassing the maximum weight allowed by the machinery.</p> <p>The handler shall not be used as hoisting equipment, unless approved equipment is used. The maximum speed at which the telescopic handler when empty can move shall be 20 Km/h on the farm. Reduce the speed in areas with pedestrians, slippery ground and ramps.</p> <p>The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin.</p> <p>Transporting operators on the vehicle and in the vehicle's interior, as well as people on top of the load, is prohibited</p> <p>The use of mobile telephones is not allowed while driving the vehicle.</p> <p>The use of a seat belt shall always be mandatory. Take extra care in areas with uneven ground, such as ramps, etc.</p> <p>In the event that the forklift is overturned, do not jump off it; instead, firmly grip the wheel, attempt to move away from the impact side and lean forward.</p> <p>If the load prevents good visibility, move in reverse with the help of a colleague.</p>	1	1	1

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
						<p>To the extent possible, vehicles and pedestrians shall be segregated so that the crossings are defined.</p> <p>Forklifts must have a parking lot in an area that does not interfere with crossing workers or other types of vehicles.</p> <p>The fork must always be 20 cm from the ground when the forklift is being driven, regardless of whether or not it is carrying a load. The mast must be tilted backwards when driving.</p> <p>Loading and discharge positioning maneuvers shall be done slowly and with the utmost caution. The mast shall be in vertical position, the load deposited, backing up until the fork is completely removed, lowering the fork to the previously mentioned distance and moving the fork backwards.</p> <p>Never leave the forklift with the motor running.</p> <p>Do not exceed the maximum load.</p> <p>Do not lift the load with a single fork tine.</p> <p>Before starting to use the forklift, the area where the work is to be done must be inspected to ensure there are no obstacles or work being done by other workers. If several jobs must be done in the same area, one individual must monitor the forklift's movements. This person shall be appointed by the farm supervisor.</p>			

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Loading and unloading of: Nacelles	Lack of communication	Collisions or bumping into vehicles Entrapment Others	3	4	12	A person shall be appointed in charge of supervising the operations. This party's duties shall be coordination of the operations and monitoring the individuals involved and third parties that may be present in the vicinity Radio equipment shall be used for communication between workers.	1	4	4
	Maneuvering and movement of maintenance vehicles	Collisions or bumping into vehicles	3	4	12	Maintenance vehicles shall be equipped with acoustic warning and light that is triggered during reverse gear operations. The vehicle's driver must pay attention constantly to the maneuvering area. Only individuals involved in the maneuvering shall be allowed to remain in the maneuvering area.	1	4	4
	Non-use of PPEs	Running over Falling objects. Entrapment Others	3	4	12	All the staff present must wear a reflective vest or reflective clothing and safety helmet and boots. Workers who manually perform mechanical coupling shall use mechanical protective gloves.	3	1	3
	Loads being handled	Falling loads Entrapment Others	3	5	15	Standing under loads (nacelle) or under the truck and spool is strictly forbidden. Maintain a safety distance of at least 2 meters when coupling operations are performed.	3	1	3
	Lack of ground resistance	Entrapment of staff due to overturned nacelle	3	5	15	Before resting the nacelle on the planks, the ground must be checked to ensure it offers appropriate resistance. If the ground resistance cannot be ensured, load distribution sheets must be placed under it.	1	5	5
Loading and unloading of nacelles with base- plate. (The same rules apply as for the previous point, except for the point prohibiting standing beneath the nacelle. In addition, the following preventive measures shall be applied.)	Risk of crushing	Unexpected dropping of the nacelle	3	5	15	In order to prevent the nacelle from dropping unexpectedly due to a fault in the truck's hydraulic system, it shall be mandatory to follow the WKI entitled Unloading Nacelle with Base Plate on farm under Nooteboom system. This document defines the type of block and where it must be placed to avoid the risk.	1	5	5

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Poor ground resistance	Entrapment of staff due to overturned nacelle	3	5	15	Before resting the nacelle on the planks as defined in the health and safety plan, the ground must be checked to ensure it offers appropriate resistance. If the ground resistance cannot be ensured, load distribution sheets must be placed under it.	1	5	5
	Flying blocks when transport beams are removed	Workers knocked down by wood blocks	3	4	12	Placing the blocks lengthwise in the same direction as the beam shall not be allowed; they must always be placed crosswise. A safety distance of no less than 6 m must be kept when the beam is placed on each block.	1	3	3
	Loads being handled	Falling loads Entrapment, overexertion	3	4	12	The crosswise support beams on the base plate must be handled using the telescopic handler, avoiding overexertion at all times. The other additional blocks can be handled between two people.	1	3	3
	Falling from a different level	Falling handler or tractor head from a different level	3	5	15	Due to the fact that the transport vehicle is very large in size, an inspection must be conducted prior to unloading to ensure that the operation can be made and marking off the danger zone with beacons in potentially hazardous areas. For example, slopes near the maneuvering area.	1	5	5
	Poor communication	Risk of blows, entrapment, others	3	5	15	Communication between the operator in the truck's cabin or in the telescopic handler with the manager or person in charge of unloading must be smooth, clear and giving specific orders. When pulling of either the tractor head or the telescopic handler begins, care must be taken to ensure that no one is in the area of action of the operation.	1	5	5

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Loading and unloading of: tower sections blades hub other material	Work on the truck platform	Falling from a different level	3	3	9	When inspecting materials, installing hoisting elements or loading and unloading the truck, it must be completely stopped, the parking brake must be on and blocks placed under the wheels to completely immobilize the truck. Take special care when entering the platforms and moving on them to inspect the material and install hoisting elements for unloading of the truck. If necessary, approved auxiliary resources must be used (ladders) to access the platform, and such resources must be in good condition.	2	2	4

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Inappropriate use of the telescopic handler	Damages caused by traffic accidents, overturned loads, overturned equipment, loads out of control.	3	5	15	<p>The telescopic handler can only be used by qualified personnel; in other words, individuals who have received specific training on operating these types of equipment. This aspect shall be guaranteed by delivering documents that prove the qualifications of the operators driving the equipment in accordance with Vestas procedure MED BP 04.06.00 Coordination of activities with subcontracted companies.</p> <p>The certificate showing that the relevant check-ups are up-to-date shall be requested from the supplier.</p> <p>Operators shall not carry loads with a weight surpassing the maximum weight allowed by the machinery.</p> <p>The handler shall not be used as hoisting equipment, unless approved equipment is used.</p> <p>The maximum speed at which the telescopic handler can move shall be 20 Km/h on the farm. It shall comply with the established limits on public roads.</p> <p>The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin.</p> <p>Transporting operators and second passengers on the vehicle and in the vehicle's interior is prohibited.</p> <p>The use of mobile telephones is not allowed while driving the vehicle.</p>	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Inappropriate handling of cranes	Damages caused by traffic accidents, overturned loads, overturned equipment, loads out of control.	3	5	15	The crane can only be used by trained staff, in other words, staff that have received specific training to drive said vehicles. Moreover, the supplying company must provide guarantee that the crane's relevant checks are up-to-date. To do so, they shall deliver the documents that prove the corresponding revisions and qualifications of the operators driving such equipment, in accordance with Vestas procedure MED BP 04.06.00 Coordination of activities with subcontracted companies. The company supplying the crane must acknowledge and comply with the precautions set forth in the appendix document “ Self-propelled Mobile Crane Safety Manual ”. A second person inside the cabin is forbidden. The use of mobile telephones during operation of the crane is prohibited. The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin.	1	3	3
	Leaving the crane cab.		2	5	10	It is prohibited to abandon the cab of the crane during the lifting or there is a load suspended from the crane hook. In the event that for any reason, the crane operator must leave the cabin, must tell the responsible of the lift the issue in order to ensure that EVERYONE abandon the danger area. The person in charge/responsible of the works on site designated in the FR149, lifting plan, shall be the person who guarantees the fencing of the danger zone until the crane operator returns to the cabin. If it is a second crane operator not covered by the permit to work, lifting plan FR 149, it shall be designated in the same Form as a new responsible of the crane company and approved by the Site manager of Vestas . The minimum distance for the fencing will be the height of the lifted component plus 30 meters.	1	5	5

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Evacuation of the cab with ladder blocked		2	5	10	It is the responsibility of the Project Manager / Site Manager that the crane company must integrate in its risk assessment "how to evacuate the crane cab taking into account the possible blocking of the stairs to the cabin. This requirement should be required for each company and type of crane when applicable	1	3	3
	Falling load due to breakage of hoisting elements	Falling load on employees Entrapment	3	5	15	<p>Keep individuals not involved in the operations out of their range of action.</p> <p>At no time shall employees stand under the hanging load or between the hanging object and immobile objects.</p> <p>Use tag lines for moving loads with a considerable volume (blades, tower sections, etc.)</p> <p>All the employees involved in the operation must be in direct contact with the others and the crane operator.</p> <p>All employees must use a safety helmet and boots, reflective vest and mechanical protective gloves.</p> <p>Use only hoisting equipment approved by VESTAS, that has undergone a prior visual inspection by the operation manager, filling in the relevant forms for each item to be hoisted, in accordance with instruction MED INS 30.01.01, This hoisting equipment shall also be subject to periodic operational control by competent parties, referring to the same procedure.</p> <p>The transport vehicle driver must step out of the driver's cab while loading and unloading is done. At such time, the driver must use the relevant worksite protection equipment: safety helmet and boots, reflective vest.</p>	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Storage of material	Inappropriate storage	Entrapment due to overturned items	2	4	8	The elements shall be stored with their storage implements in flat zones that are free of slopes, guaranteeing the stability of the components to keep them from tipping over. If these implements must be removed, they shall rest on polystyrene pieces and/or wood planks placed on ground level to keep them stabilized. If these elements, due to their shape, can accidentally roll over, chocks shall be placed to keep this movement from occurring. These support elements must be inspected previously in order to detect any possible wear that could lead to cracking when weight is placed on them, making the load fall.	1	4	4
	Lack of order and cleanliness	Blows, cuts, same-level falls Inappropriate action taken in emergencies Inappropriate first aid action	4	2	8	Loads must be distributed in a stable, orderly fashion, avoiding leaving loose material on the ground that could cause trips, falls and blows. This material must be placed at all times in wood drawers. Stockpiled material must never block the way for vehicles on roads	2	2	4
Preparation of turbine installation	Interference with heavy machinery in the civil engineering work	Running over with heavy machinery	3	5	15	All employees must wear compulsory personal protection equipment such as safety helmets and boots and reflective vests. Be particularly careful with heavy vehicles in charge of civil engineering work.	1	3	3
	Uneven ground Disorder and lack of cleanliness in installation areas	Same-level falls Knocks	3	3	9	Ask the developer to prepare the work area and ensure that there are optimal cleanliness and order conditions on the platforms in accordance with the contract specifications, for the movements of operators, storage of material and crane positioning.	1	3	3
	Ditches, slopes	Falling from a different level	3	4	12	Ask the developer to fully protect any slopes on wind turbine installation platforms and work areas, and put up signs where they cannot be closed off.	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Access of third parties to the installation	Damages to third parties	3	4	12	Set out beacons around the work area and place signs prohibiting the entrance of any unauthorized parties on the installation work site.	2	2	4
Preparation and assembly of tubular tower: Inspection of material	Access to the stockpiled tube placed horizontally for inspection	Blows, entrapment	3	3	9	Before entering, verify that the tower section is piled so that it is stable. Wear safety helmets and boots inside the section	3	1	3
Preparation and assembly of tubular tower: Cleaning and removal of nicks and scratches from the flanges on the tower sections	Use of manual sanding tools	Entrapment Particles projected into the eyes Cuts on hands	3	3	9	Before entering, verify that the tower section is piled so that it is stable Wear protective goggles and mechanical protective gloves in addition to the other compulsory personal protective equipment during the operation.	3	1	3
Preparation and assembly of tubular tower: Repair of tube surface. Painting	Access to the stockpiled tube placed horizontally for inspection	Blows, entrapment	3	5	15	Repairs shall be made before hoisting the section, thus avoiding working under hanging loads. Before entering, verify that the tower section is piled so that it is stable. Wear safety helmets and boots inside the section	3	1	3
	Handling of hazardous substances	Damages resulting from handling hazardous substances.	2	2	4	Always wear chemical protection gloves. Wear goggles if there is a risk of splashing. A copy of the safety sheet of the chemical products used shall be available on-site, stating the preventive measures to be applied.	1	1	1
Preparation and assembly of tubular tower: Application of sealant on tower sections	Handling of hazardous substances	Damages resulting from handling hazardous substances.	2	2	4	Always wear chemical protection gloves. Wear goggles if there is a risk of splashing. A copy of the safety sheet of the chemical products used shall be available on-site, stating the preventive measures to be applied.	1	1	1

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Preparation and assembly of tubular tower: Installation of cabinets at the base of the wind turbine	Crane overturning and a lack of control over loads due to inappropriate use of the crane.	Entrapment, knocks, etc., due to falling objects, or lack of control thereof.	3	5	15	<p>The crane can only be used by trained staff, in other words, staff that have received specific training to drive said vehicles. Moreover, the supplying company must provide guarantee that the crane's relevant checks are up-to-date. To do so, they shall deliver the documents that prove the corresponding revisions and qualifications of the operators driving such equipment, in accordance with Vestas procedure MED BP 04.06.00 Coordination of activities with subcontracted companies.</p> <p>The company supplying the crane must acknowledge and comply with the precautions set forth in the appendix document “Self-propelled Mobile Crane Safety Manual”.</p> <p>A second person inside the cabin is forbidden.</p> <p>The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin.</p> <p>The use of mobile telephones during operation of the crane is prohibited.</p>	1	3	3
	Falling load due to breakage of hoisting elements	Falling load on employees Entrapment Knocks	3	5	15	<p>Keep individuals not involved in the operations out of their range of action.</p> <p>At no time shall employees stand under the hanging load or between the hanging object and immobile objects.</p> <p>Use tag lines for moving loads with a considerable volume</p> <p>All the employees involved in the operation must be in direct contact with the others and the crane operator.</p> <p>All employees must use a safety helmet and boots, reflective vest and mechanical protective gloves.</p> <p>Use only hoisting equipment approved by VESTAS that has undergone a prior visual inspection by the operation manager to lift this material. In addition to this check, such hoisting equipment shall be subject to periodic operational control by competent parties.</p>	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Preparation and assembly of tubular tower: Erection of tower sections	Crane overturning and a lack of control over loads due to inappropriate use of the crane.	Entrapment, knocks, etc., due to falling objects, or lack of control thereof.	3	5	15	<p>The crane can only be used by trained staff, in other words, staff that have received specific training to drive said vehicles. Moreover, the supplying company must provide guarantee that the crane's relevant checks are up-to-date. To do so, they shall deliver the documents that prove the corresponding revisions and qualifications of the operators driving such equipment, in accordance with Vestas procedure MED BP 04.06.00 Coordination of activities with subcontracted companies.</p> <p>The company supplying the crane must acknowledge and comply with the precautions set forth in the appendix document “Self-propelled Mobile Crane Safety Manual”.</p> <p>A second person inside the cabin is forbidden. The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin.</p> <p>The use of mobile telephones during operation of the crane is prohibited.</p>	1	3	3
	Loose material, dirt, inside the tower section	Falling objects.	3	4	12	<p>Clean any stones and earth inside the tower, remove tools and any materials inside that are not firmly attached to the tower section structure. No workers must be standings under the tower section when the section is positioned vertically.</p>	1	1	1

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Work under hanging loads. Falling load due to breakage of hoisting elements	Falling load on employees Entrapment Knocks	3	5	15	<p>Keep individuals not involved in the operations out of their range of action.</p> <p>Employees who must stand under the section shall maintain a safety distance with the fixed elements (ladder, elevator shaft protection, etc.).</p> <p>The assembly operation of the T1 with the collar shall be done by turning the section from the outside. No one must stand on the collar.</p> <p>Do not put extremities or body parts between the flanges when fitting them to each other.</p> <p>Use tag lines for moving the load.</p> <p>All the employees involved in the operation must be in direct contact with the others and the crane operator.</p> <p>All employees must use a safety helmet and boots, reflective vest and mechanical protective gloves.</p> <p>Work done under hanging loads shall be done exclusively with equipment approved by VESTAS for lifting this material, previously visually inspected by the operation manager, and subjected to periodic operational control by qualified personnel.</p> <p>The visual inspection shall take place each time the item is used and a record shall be kept of the process, by filling out the forms FR 023 or FR 122 (depending on the model) in accordance with instruction MED INS 30.01.01.</p>	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Preparation and assembly of tubular tower: Tightening/torqueing of bolts	Inappropriate use of electrical and hydraulic tightening tools: <ul style="list-style-type: none"> Electricity High oil pressure Hazardous substances Moving parts Falling of loose objects Noise 	Getting caught up Sprayed high-pressure oil. Contact with oil. Electric shock Noise	2	3	6	Check the inspection labels to determine whether wrench, hoses and pump have been properly inspected. A visual inspection must be carried out before using all the tools. Wear mechanical protection gloves. Wear safety goggles. Use hearing protection. Hydraulic wrench placement and operation of the service box will be carried out preferably by the same person. Exceptionally, in the event that two workers participate in the operation, they must agree beforehand on the verbal orders to be used. The worker operating the service box must always keep eye contact with the tightening area. Hydraulic wrench and Makita tool sockets must be fastened with available locking pins to avoid potential falls or projections.	1	2	2
	Tightening the flange bolts over the elevator shaft	Falls from height	3	5	15	When tightening the bolts on all the upper platforms, the operator must use a fall arrest system composed of a full body harness (EN 361) attached to a fixed point (ladder rung) using a fall protection device (EN 360).	1	3	3
Preparation and assembly of tubular tower: Access to the tower	Inappropriate use of ladders	Falling from a different level	3	3	9	Approved ladders that are in good condition, the correct size and attached to the tower at the top shall be used to enter the tower until the original access ladder to the wind turbine is available. The original ladder is preassembled so that once the first section has been assembled, the ladder is installed and can be used to access the tower.	1	2	2
Preparation and assembly of tubular tower: Climbing the tower sections	High-rise works	Falls from height	3	5	15	In order to access the upper platforms to release the hoisting elements and to assemble the other sections, a fall arrest system composed of a fall protection harness shall be used, and an AVANTI fall protection device shall be used to climb the ladder anchored to an AVANTI lifeline. This line must have a suitability certificate issued by the competent party.	3	1	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Preparation and assembly of tubular tower: Electrical installation	High-rise works	Falls from height	3	5	15	In order to move around the tower to connect the electrical installation, a fall arrest system composed of a fall protection harness shall be used, and an AVANTI fall protection device shall be used to climb the ladder anchored to an AVANTI lifeline. This line must have a suitability certificate issued by the competent party.	3	1	3
	Electricity	Electrical contacts	3	5	15	The circuit shall remain voltage-free during the installation, disconnecting the generating set from it. If necessary, alternative lighting can be used occasionally, with a lamp on the front of the helmet during this operation	1	1	1
Preparation and assembly of tubular tower: Distribution of the lower platform	Holes in the lower platform	Falls from height	3	3	9	Use fall arrest system during the lifting operation of the cabinets to the platform, and for any movements to be made near this opening, until it is closed again	1	1	1
	Handling of cabinets.	Overexertion. Entrapment Falling objects.	3	3	9	Use portable hoisting equipment to move loads on the platforms. This equipment must also be approved and checked prior to use thereof, and undergo periodic inspections by the competent party.	1	1	1
Preparation of the nacelle on the ground Access	Inappropriate use of ladders	Falls from height	3	3	9	To access the roof of the nacelle, ladders should not be used, but instead access should be made from the interior. Access to the inside of the nacelle is through the side door	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Preparation of the nacelle on the ground Preparation of installations Wiring Turning gear assembly. Storage of oil	Posture requirements Manual handling of loads	Overexertion. Entrapment Knocks Cuts.	3	3	9	Do not perform activities requiring demanding postures for prolonged periods of time, rotating with colleagues and taking breaks. Place all the material that will be needed when the nacelle is erected inside the nacelle. Use portable lifting equipment such as pulleys to lift and handle heavy material inside the nacelle. Be particularly careful when moving material, always avoiding positioning one's body between the material handled and the structure. Compulsory protective equipment such as safety helmets and boots and mechanical protective gloves must be used.	1	2	2
	Limited space for movements Lack of order and cleanliness Floors coated in grease	Knocks Cuts Same-level falls	3	3	9	Be particularly careful with movements inside the nacelle Maintain a relative amount of order and cleanliness inside the nacelle, refraining from stockpiling material in passageways, and cleaning any zones that could become slippery due to spilled oil, etc. Compulsory protective equipment such as safety helmets and boots and mechanical protective gloves must be used.	1	1	1
	Work done on the nacelle on the ground	Falls from height	3	3	9	For all work done on the nacelle roof, a fall arrest system composed of a harness attached to a fixed point on the nacelle using a double lanyard with absorber shall be used. Two shall be needed, therefore, in movements on the nacelle, in order to be constantly attached to a fixed point.	3	1	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Preparation of the nacelle on the ground Cooler assembly	Crane overturning and a lack of control over loads due to inappropriate use of the crane.	Entrapment, knocks, etc., due to falling objects, or lack of control thereof.	3	5	15	The crane can only be used by trained staff, in other words, staff that have received specific training to drive said vehicles. Moreover, the supplying company must provide guarantee that the crane's relevant checks are up-to-date. To do so, they shall deliver the documents that prove the corresponding revisions and qualifications of the operators driving such equipment, in accordance with Vestas procedure MED BP 04.06.00 Coordination of activities with subcontracted companies. The company supplying the crane must acknowledge and comply with the precautions set forth in the appendix document “ Self-propelled Mobile Crane Safety Manual ”. A second person inside the cabin is forbidden. The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin. The use of mobile telephones during operation of the crane is prohibited.	1	3	3
	Falling load due to breakage of hoisting elements	Falling load on employees Entrapment Knocks	3	5	15	Keep individuals not involved in the operations out of their range of action. At no time shall employees stand under the hanging load or between the hanging object and immobile objects. Use tag lines for moving loads with a considerable volume All the employees involved in the operation must be in direct contact with the others and the crane operator. All employees must use a safety helmet and boots, reflective vest and mechanical protective gloves. Use only hoisting equipment approved by VESTAS that has undergone a prior visual inspection by the operation manager to lift this material. In addition to this check, such hoisting equipment shall be subject to periodic operational control by competent parties.	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Work done on the nacelle	Falls from height	3	3	9	For all work done on the nacelle roof, a fall arrest system composed of a harness attached to a fixed point on the nacelle using a double lanyard with absorber shall be used. Two shall be needed, therefore, in movements on the nacelle, in order to be constantly attached to a fixed point.	3	1	3
	Exposure to hazardous substances while filling the expansion tank in the cooling system	Danger of irritated skin and eyes due to contact with coolant	3	3	9	The safety sheet on the lubricating grease must be available and the safety rules set forth therein shall be followed. Use chemical protection gloves and safety goggles.	2	1	1
	Use of lifting platform for side bolting of cooler to nacelle	Falls from height	3	5	15	The lifting platform can only be used by qualified personnel; in other words, individuals who have received specific training on operating these types of equipment. Moreover, the supplying company must provide guarantee that the platform's relevant checks are up-to-date. To this end, the rental company of these platforms shall guarantee the suitability and proper condition of the platforms, delivering documents that prove the relevant inspections have been made and the qualifications of the operators driving them in accordance with Vestas internal procedure 04.06.00 Coordination of activities with subcontracted companies.	1	5	5

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Use of ladders	Falls from height	3	5	15	Work on ladders shall be done facing the ladder. Ladders must be used in such a manner that the workers always have a safe point to stand and hold on to. Work done at a height of more than 3.5 meters between the operation point and the ground, requiring dangerous movements or efforts for the workers' stability, shall only take place if personal fall protection equipment is used or alternative protection measures are taken. Manual transport of a load on a ladder shall be done in such a way that such operation does not prevent the user from holding on safely. Transporting and handling loads on or from ladders, when the weight or size thereof could compromise the worker's safety, is prohibited. Ladders cannot be used by two or more people at once	1	5	5
Preparation and installation of the hub Installation of the lifting tool	Inappropriate installation of the hub lifting tool	Falling load	3	5	15	Assemble the lifting tool structure according to the specifications in the manual.	1	1	1
	Manual handling of loads	Overexertion.	3	3	9	The tool structure shall be installed by taking the tool up the crane, which is guided by employees on the ground. Bolts shall be tightened by several people in order to adjust the torque wrench to the bolt to avoid movement thereof when tightened.	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Preparation and installation of the hub Nose cone assembly	Crane overturning and a lack of control over loads due to inappropriate use of the crane.	Entrapment, knocks, etc., due to falling objects, or lack of control thereof.	3	5	15	<p>The crane can only be used by trained staff, in other words, staff that have received specific training to drive said vehicles. Moreover, the supplying company must provide guarantee that the crane's relevant checks are up-to-date. To do so, they shall deliver the documents that prove the corresponding revisions and qualifications of the operators driving such equipment.</p> <p>The company supplying the crane must acknowledge and comply with the precautions set forth in the appendix document “Self-propelled Mobile Crane Safety Manual”.</p> <p>A second person inside the cabin is forbidden.</p> <p>The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin.</p> <p>The use of mobile telephones during operation of the crane is prohibited.</p>	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Work under hanging loads. Falling load due to breakage of hoisting elements	Falling load on employees Entrapment Knocks	3	5	15	Keep individuals not involved in the operations out of their range of action. Do not stand between the hanging object and immobile objects (nacelle). It is not necessary to stand beneath the load either. First, the nose must be placed on the hub, at which time the operator shall go inside the hub and guide the crane operator from the inside to adjust it to the bolt holes. The corresponding nuts and bolts shall then be taken out of the control cabinet located on the nose. Use tag lines for moving the load, if necessary. All the employees involved in the operation must be in direct contact with the others and the crane operator. All employees must use a safety helmet and boots, reflective vest and mechanical protective gloves. Only equipment approved by VESTAS for lifting this material, previously visually inspected by the operation manager, and subjected to periodic operational control by qualified personnel, shall be used. The visual inspection shall take place each time the item is used and a record shall be kept of the process, by filling out form FR 118 in accordance with instruction MED INS 30.01.01.	1	3	3
	Handling of hazardous substances while sealing the nose cone	Damages resulting from handling hazardous substances.	3	3	9	Always wear chemical protection gloves. Wear goggles if there is a risk of splashing. A copy of the safety sheet of the chemical products used shall be available on-site, stating the preventive measures to be applied.	1	1	1

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Preparation and installation of the hub Mounting hub on nacelle	Crane overturning and a lack of control over loads due to inappropriate use of the crane.	Entrapment, knocks, etc., due to falling objects, or lack of control thereof.	3	5	15	<p>The crane can only be used by trained staff, in other words, staff that have received specific training to drive said vehicles. Moreover, the supplying company must provide guarantee that the crane's relevant checks are up-to-date. To do so, they shall deliver the documents that prove the corresponding revisions and qualifications of the operators driving such equipment.</p> <p>The company supplying the crane must acknowledge and comply with the precautions set forth in the appendix document “Self-propelled Mobile Crane Safety Manual”.</p> <p>A second person inside the cabin is forbidden.</p> <p>The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin.</p> <p>The use of mobile telephones during operation of the crane is prohibited.</p>	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Falling load due to breakage of hoisting elements	Falling load on employees Entrapment Knocks	3	5	15	Keep individuals not involved in the operations out of their range of action. Do not stand between the hanging object and immobile objects (nacelle). Do not lift the load with people inside Use tag lines for moving the load. All the employees involved in the operation must be in direct contact with the others and the crane operator. All employees must use a safety helmet and boots, reflective vest and mechanical protective gloves. Only equipment approved by VESTAS for lifting this material, previously visually inspected by the operation manager, and subjected to periodic operational control by qualified personnel, shall be used. The visual inspection shall take place each time the item is used and a record shall be kept of the process, by filling out the forms FR 024 or FR 096 or FR038 or FR039 (depending on the model) in accordance with instruction MED INS 30.01.01.	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Preparation and installation of the hub Tightening bolts	Inappropriate use of electrical and hydraulic tightening tools: <ul style="list-style-type: none"> Electricity High oil pressure Hazardous substances Moving parts Falling of loose objects Noise 	Getting caught up Sprayed high-pressure oil. Contact with oil. Electric shock Noise	2	3	6	Check the inspection labels to determine whether wrench, hoses and pump have been properly inspected. A visual inspection must be carried out before using all the tools. Wear mechanical protection gloves. Wear safety goggles. Use hearing protection. Hydraulic wrench placement and operation of the service box will be carried out preferably by the same person. Exceptionally, in the event that two workers participate in the operation, they must agree beforehand on the verbal orders to be used. The worker operating the service box must always keep eye contact with the tightening area. Hydraulic wrench and Makita tool sockets must be fastened with available locking pins to avoid potential falls or projections.	1	2	2
Preparation and installation of the hub Dismantling of the lifting tool	Standing on the blade bearing to loosen nuts	Falls from height	3	4	12	The worker shall stand on the hub bearing where the tool is housed, using a fall arrest system composed of a safety harness (EN 361) to be anchored to the nacelle rail using a lanyard with double absorber (EN 355) to enable movements at heights	3	2	6
	Unexpected swaying movement as the tool gets stuck upon dismantling	which may knock the worker during dismantling	3	3	9	The tool shall only be handled using the same self-supporting crane that was used to install the hub. Never remove it with a self-supporting truck, as a perfectly vertical movement is needed and it is very important to ensure that the bolts holding it are completely loosened	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Mounting of nacelle on tower Installation of the lifting tool	Inappropriate use of ladders	Falls from height	3	3	9	<p>Approved ladders that are in good condition, the correct size and attached to the nacelle at the top shall be used to enter the nacelle roof to access the upper hatch.</p> <p>In order to climb onto the nacelle roof, a fall arrest system composed of a harness attached to the rail installed on the nacelle using a lanyard with absorber shall be used.</p> <p>Two lanyards shall be used to progress along the nacelle, remaining anchored at all times.</p>	1	2	2
	Work done on the nacelle on the ground	Falls from height	3	3	9	<p>For all the tasks to be performed on the nacelle roof, as well as the removal of the roof to install the lifting tool, aviation lights, anemometers, etc., a fall arrest system composed of a harness attached to the rail installed or to anchoring points on the nacelle using a lanyard with absorber shall be used. Two shall be needed, therefore, in movements on the nacelle, in order to be constantly attached to a fixed point.</p>	3	1	3
	Inadequate installation of the lifting tool on the nacelle	Falling load	3	5	15	<p>Assemble the lifting tool structure according to the specifications in the manual.</p>	1	1	1

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Mounting of nacelle on tower Assembly of nacelle on tower	Crane overturning and a lack of control over loads due to inappropriate use of the crane.	Entrapment, knocks, etc., due to falling objects, or lack of control thereof.	3	5	15	The crane can only be used by trained staff, in other words, staff that have received specific training to drive said vehicles. Moreover, the supplying company must provide guarantee that the crane's relevant checks are up-to-date. To do so, they shall deliver the documents that prove the corresponding revisions and qualifications of the operators driving such equipment. The company supplying the crane must acknowledge and comply with the precautions set forth in the appendix document “ Self-propelled Mobile Crane Safety Manual ”. A second person inside the cabin is forbidden. The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin. The use of mobile telephones during operation of the crane is prohibited.	1	3	3
	Falling load due to breakage of hoisting elements	Falling load on employees Entrapment Knocks	3	5	15	Keep individuals not involved in the operations out of their range of action. Do not stand between the hanging object and immobile objects. Do not lift the load with people inside Use tag lines for moving the load. All the employees involved in the operation must be in direct contact with the others and the crane operator. All employees must use a safety helmet and boots, reflective vest and mechanical protective gloves. Only equipment approved by VESTAS for lifting this material, previously visually inspected by the operation manager, and subjected to periodic operational control by qualified personnel, shall be used. The visual inspection shall take place each time the item is used and a record shall be kept of the process, by filling out the forms FR 025 or FR 32 (depending on the model) in accordance with instruction MED INS 30.01.01.	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Approaching load to assembly point	Entrapment	3	4	12	The employee shall guide the crane operator from the upper tower platform. Do not place extremities between the hub and the blade being assembled. Do not use the guiding pins to aim the nacelle, as this could lead to potential entrapment situations. Push the nacelle flange directly or by fixing securing elements (ropes) or magnets to it to steer it, pulling the ropes or magnets.	2	2	4
Mounting of nacelle on tower Tightening/torqueing of bolts	Inappropriate use of electrical and hydraulic tightening tools: <ul style="list-style-type: none"> Electricity High oil pressure Hazardous substances Moving parts Falling of loose objects Noise 	Getting caught up Sprayed high-pressure oil. Contact with oil. Electric shock Noise	2	3	6	Check the inspection labels to determine whether wrench, hoses and pump have been properly inspected. A visual inspection must be carried out before using all the tools. Wear mechanical protection gloves. Wear safety goggles. Use hearing protection. Hydraulic wrench placement and operation of the service box will be carried out preferably by the same person. Exceptionally, in the event that two workers participate in the operation, they must agree beforehand on the verbal orders to be used. The worker operating the service box must always keep eye contact with the tightening area. Hydraulic wrench and Makita tool sockets must be fastened with available locking pins to avoid potential falls or projections.	1	2	2
Mounting of nacelle on tower Releasing lifting equipment/reinstalling roofs/removing tag lines	Work done on the nacelle	Falls from height	4	5	20	A fall arrest system composed of a harness attached to the rail installed or to anchoring points on the nacelle using a lanyard with absorber shall be used. Two shall be needed, therefore, in movements on the nacelle, in order to be constantly attached to a fixed point.	4	1	4
	Release the tag lines	Falling objects.	4	5	20	Notify the employees on the ground that the tag lines have been released to prevent them from falling on the employees.	4	1	4

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Mounting of nacelle on tower Install the yaw cable on the nacelle	Electricity	Electrical contacts	3	5	15	The circuit must be voltage-free during installation. The connections shall be made airtight.	1	1	1
	Malfunctioning due to inadequate installation	Undefined damages	3	3	9	Follow the specifications in the installation manual for proper installation	1	1	1
Horizontal mounting of individual blades Blade preparation	Overtaken support frames during removal	Crushing, blows due to falling frame Overexertion.	3	5	15	In order to remove the support frame from the blade root, the frame must be held in place by an auxiliary crane so that it does not accidentally tip over when the bolts are removed. At no time shall the assembly staff hold up this structure to prevent it from tipping over. Do not drag the supports manually, but rather, always use mechanical means to move them.	1	3	3
	Crane overturning and a lack of control over loads due to inappropriate use of the crane.	Entrapment, knocks, etc., due to falling objects, or lack of control thereof.	3	5	15	Cranes can only be used by qualified employees, in other words, staff that have received specific training to drive said vehicles. Moreover, the supplying company must provide guarantee that the crane's relevant checks are up-to-date. To do so, they shall deliver the documents that prove the corresponding revisions and qualifications of the operators driving such equipment. The company supplying the crane must acknowledge and comply with the precautions set forth in the appendix document “ Self-propelled Mobile Crane Safety Manual. ”. A second person inside the cabin is forbidden. The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin. The use of mobile telephones during operation of the crane is prohibited.	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Falling load due to breakage of hoisting elements	Falling load on employees Entrapment Knocks	3	5	15	Keep individuals not involved in the operations out of their range of action. Do not stand between the hanging object and immobile objects. Use tag lines for moving the load. All the employees involved in the operation must be in direct contact with the others and the crane operator. All employees must use a safety helmet and boots, reflective vest and mechanical protective gloves. Only equipment approved by VESTAS for lifting this material, previously visually inspected by the operation manager, and subjected to periodic operational control by qualified personnel, shall be used. The visual inspection shall take place each time the item is used and a record shall be kept of the process, by filling out form FR 060 in accordance with procedure MED BP 30.01.01.	1	3	3
	Incorrect turning of blades	Falls from heights Crushing	3	5	15	All blade turning operations shall be carried out on the ground, and therefore equipment (pulleys) must facilitate the activation thereof. Standing on the blade during this operation is prohibited.	1	3	3
		Entrapment due to falling blade	3	5	15	When stockpiling the blades, the polystyrene support elements on which they will be placed must be inspected to ensure they have no cracks or nicks that could lead them to break when the load is placed on them, causing it to fall.	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Bolting screws on blade	Blows, entrapment, electrical contact with electric tool. Entrapment due to overturning	3	3	9	Before starting the bolting operation, verify that the blade is in a stable position. The tool must bear the CE marking, be in good condition for use and be periodically inspected. Before using them, verify that all the tools are in correct working order. Use safety goggles, in addition to the compulsory protective equipment on work sites. Use machines and tools as indicated in the relevant manuals. Do not lock safety devices	1	2	2
	Use of manual sanding tools	Entrapment Particles projected into the eyes Cuts on hands	3	3	9	Before starting the sanding work, verify that the blade is stored in a stable position. Wear protective goggles and mechanical protective gloves in addition to the other compulsory personal protective equipment during the operation.	3	1	3
Horizontal mounting of individual blades Installation of blade hoisting tool	Incorrect installation of the nacelle lifting tool. Blade cleaning	Falling load	3	5	15	Assemble the lifting tool structure according to the specifications in the manual.	1	1	1
		Falls from height	3	3	9	At no time must anyone stand under the blade, and all operations must be performed on the ground. If the irregular terrain renders this impossible, use auxiliary means to access the anchoring points of the hoisting tool.	2	2	4

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Horizontal mounting of individual blades Movement and assembly of blades	Going from nacelle to hub without blades installed, and vice versa	Falling from heights, through blade shafts waiting to be installed	4	5	20	All personnel accessing the hub for the reception of the blade, and its subsequent tightening, must use a fall arrest system comprising the following: <ul style="list-style-type: none"> Fall arrest harness Double lanyard with absorber A sling to create an anchorage point in the hub structure. The worker will be secured, by means of the lanyard with absorber, to the fixed point created with the sling anchored to the structure, and will then access the hub. The worker will anchor himself to the internal anchorage point available inside the hub once reached. The worker can only release himself from the first anchorage point once the anchorage point inside the hub has been reached. To leave the hub, repeat operations in reverse order. The lanyard with absorber may be replaced by a fall protection system, to be installed on the hub structure with a choked sling	1	5	5
		Entrapment due to spinning out of control	3	5	15	The rotor must always be locked with manual locking pins during entry and exit and while it remains in place.	1	5	5
	Lack of light inside the hub during the installation process	Personal injury and material damage due to lack of visibility	3	5	15	Portable lighting or lighting on the front of the helmet must be available, guaranteeing a lighting level of 100 lux, until the hub wiring is installed for the hub lighting power supply.	1	1	1

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Protecting the hub from falling into the uninstalled blade	Falls from height	3	5	15	Before carrying out works inside the hub, the presence of the plate to prevent falls inside the blade will be verified. In case the plate is not installed, mount it before starting with the work. In case lighting is not adequate, portable artificial light will be used. At least 100 lux lighting is necessary to perform work inside the hub.	3	1	3
	Crane overturning and a lack of control over loads due to inappropriate use of the crane.	Entrapment, knocks, etc., due to falling objects, or lack of control thereof.	3	5	15	The crane can only be used by trained staff, in other words, staff that have received specific training to drive said vehicles. Moreover, the supplying company must provide guarantee that the crane's relevant checks are up-to-date. To do so, they shall deliver the documents that prove the corresponding revisions and qualifications of the operators driving such equipment. The company supplying the crane must acknowledge and comply with the precautions set forth in the appendix document “ Self-propelled Mobile Crane Safety Manual ”. A second person inside the cabin is forbidden. The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin. The use of mobile telephones during operation of the crane is prohibited.	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Falling load due to breakage of hoisting elements	Falling load on employees Entrapment Knocks	3	5	15	Keep individuals not involved in the operations out of their range of action. Do not stand between the hanging object and immobile objects. Do not lift the load with people inside Use tag lines for moving the load. All the employees involved in the operation must be in direct contact with the others and the crane operator. All employees must use a safety helmet and boots, reflective vest and mechanical protective gloves. Only equipment approved by VESTAS for lifting this material, previously visually inspected by the operation manager, and subjected to periodic operational control by qualified personnel, shall be used. The visual inspection shall take place each time the item is used and a record shall be kept of the process, by filling out form FR 026 in accordance with procedure MED INS 30.01.01.	1	3	3
	Approaching load to assembly point	Entrapment	3	4	12	The hub was previously yawed for the optimum position of the blade. The staff will guide the person operating the crane from inside the hub, where they can see the blade through the hole left once the blade's hub access protection is removed. Do not place extremities between the hub and the blade being assembled. The hub will be manually locked. Once it is installed, the blade access protection shall be replaced to continue with the next.	2	2	4
	Turning the hub with turning gear	Entrapment	3	5	15	All staff must exit the hub, taking the tools with them, to rotate the rotor to the new position in order to install the next blade. Once in position, the rotor must be locked manually. The hub can now be accessed again in order to repeat the assembly procedure.	1	1	1

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Horizontal mounting of individual blades Fastening the blade bolts	Use of electrical and hydraulic tightening tools: <ul style="list-style-type: none"> • Electricity • High oil pressure • Hazardous substances • Moving parts • Falling of loose objects • Noise 	Getting caught up Sprayed high-pressure oil. Contact with oil. Electric shock Noise	2	3	6	Check the inspection labels to determine whether wrench, hoses and pump have been properly inspected. A visual inspection must be carried out before using all the tools. Wear mechanical protection gloves. Wear safety goggles. Use hearing protection. Hydraulic wrench placement and operation of the service box will be carried out preferably by the same person. Hydraulic wrench and Makita tool sockets must be fastened with available locking pins to avoid potential falls or projections. Do not position yourself in the torque wrench's direction when the pressure is increased. When retightening the bolts (once the three blades are assembled) the blades must be locked.	1	2	2
Horizontal mounting of individual blades Releasing of the hoisting equipment	Releasing of the hoisting equipment on the nacelle	Falls from height	4	5	20	Once the bolts have been tightened, the operator responsible for loosening the hoisting equipment will position himself on the nacelle using an anti-fall harness. Crane operator will bring the tool closer to facilitate the releasing thereof	4	1	4
Horizontal mounting of individual blades Installation of the rings	Work done on the nacelle	Falls from height	4	5	20	The operator responsible for the installation of such rings will position himself on the nacelle using an anti-fall harness anchored to a rail with a lanyard equipped with an absorber.	4	1	4
Horizontal mounting of individual blades End of the blade assembly work	Uncontrolled movement of the blades	Collapse of the turbine due to machine's overspeed	3	5	15	Once the blades are assembled, they must be locked at 88° in order to prevent uncontrolled turning of the rotor due to the wind that would force the machine to collapse.	1	5	5

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Work performed close to coupling once the blades have been installed	Unprotected high-speed rotating parts (Gearbox star connection)	Becoming trapped due to uncontrolled rotating of the coupling	3	5	15	After the blades have been installed, the rotor must be locked when work takes place near the cardan shaft as it involves a risk of becoming trapped; this task must be checked by the team boss or preventive technician.	1	3	3
Locking the rotor in 0 wind conditions	Turning the motor using the gearbox star connection.	Becoming trapped due to uncontrolled rotating of the coupling	3	5	15	Once the blades have been installed, a turning rotor must be used to lock the rotor in 0 wind conditions. Performing this procedure manually with hands or feet is prohibited.	1	3	3
Installation of HV cable	Working on a ladder	Falls from height	3	5	15	All the operators located on the ladder to install the HV cable shall use a fall arrest system composed of a fall protection harness and an AVANTI fall protection device to climb the ladder anchored to an AVANTI lifeline. This line must have a suitability certificate issued by the competent party.	1	2	2
	Material falling during handling thereof	Blows to, collisions with, entrapment of, knocking down workers	3	4	12	Overlapping work is prohibited. Therefore, there must never be other workers not partaking in this part of the process on lower levels of the machine when the cable is hoisted. Due to workers overlapping during this task on the ladder, they must avoid carrying any equipment, tool, etc., which is likely to fall to lower levels in their pockets. If required, workers will use tool bags. The rollers must be placed on the ladder and the platform in order to prevent the cabling from rubbing against the tower's structural elements that may affect how the crane inside the nacelle tasked with hoisting the cable works. Ensure the protective cover is correctly installed (correct positioning and sufficient number of flanges to prevent it from becoming loose). Use protective equipment such as hard hats, safety gloves and boots at all times. Use of radio devices between workers guiding/supervising the hoisting of cable and the	1	4	4

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
						<p>work operating the electric crane.</p> <p>To replace, guide or position the cable on the rollers, the crane must be stopped and lowered slightly to ease the crane/cable's tension.</p> <p>A tool to replace, guide or position the cable in the rollers must be used, avoiding direct manipulation thereof with hands.</p> <p>Only equipment approved by VESTAS for lifting this material, previously visually inspected by the operation manager, and subjected to periodic operational control by qualified personnel, shall be used.</p> <p>The visual inspection shall take place each time the item is used and a record shall be kept of the process, by filling out form FR 082 in accordance with procedure MED INS 30.01.01.</p> <p>When using manual cranes during different phases of the installation of the cable, they must be checked prior to use to ensure they are in good working order, as well as have undergone a service by trained staff.</p> <p>Once the cable has been hoisted, tighten it to the torque indicated in the installation's technical specifications.</p>			
	Posture requirements Manual handling of loads	Overexertion. Entrapment Knocks Cuts.	3	3	9	<p>Do not perform activities requiring demanding postures for prolonged periods of time, rotating with colleagues and taking breaks.</p> <p>Use portable lifting equipment such as pulleys to lift and handle heavy material inside the nacelle.</p> <p>Be particularly careful when moving material, always avoiding positioning one's body between the material handled and the structure.</p> <p>Compulsory protective equipment such as safety helmets and boots and mechanical protective gloves must be used.</p>	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Limited space for movements Lack of order and cleanliness Floors coated in grease Stepping on objects.	Knocks Cuts. Same-level falls	3	3	9	Be particularly careful with movements inside the nacelle Maintain a relative amount of order and cleanliness inside the nacelle, refraining from stockpiling material in passageways, and cleaning any zones that could become slippery due to spilled oil, etc. Compulsory protective equipment such as safety helmets and boots and mechanical protective gloves must be used. At the height of the foundation ring, the lower end of the cable must be attached to the tower's flange prior to its connection, in order to ensure that workers do not step on it when descending the ladder and the consequent injury hazard.	1	1	1
Connection of the HV cable to the transformer and switchgears	Poor connection of the phases	Explosion, fire when connected to the grid	3	4	12	Make the connections pursuant to the installation's technical specifications. Do not remain inside the wind turbine during connection to the grid.	1	1	1
Installation of wiring Connection of the electric and hydraulic system	Poor connection of the phases	Explosion, fire when connected to the grid Oil leaks Lack of control over the machine	3	4	12	Make the electric and hydraulic connections pursuant to the installation's technical specifications. Do not remain inside the wind turbine during connection to the grid.	1	1	1
Assembly of the service lift: Assembly of Shark double door cabin	Movement of wind turbine's incomplete lower platform	Falls from height	3	4	12	The service lift will be assembled at ground level on the lower platform. The platform upon which it is assembled (the lower platform) must be completely installed, free of holes or openings that may cause workers to fall. The ladder's and service lift's hole will have the corresponding handrails.	1	4	4

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Handling heavy elements	Overexertion.	2	3	6	<p>The maximum weight to handle manually must not exceed 25 kg. If the weight exceeds this, the help of another worker or mechanical means are required.</p> <p>Occasionally, practiced workers can lift up to 40 kg.</p> <p>Bend at the knees when lifting loads.</p> <p>Avoid turning your spine when handling loads.</p> <p>Try to hold the load tightly.</p> <p>Use mechanical tools to tighten bolts, nuts and screws.</p> <p>Organize the movements of the components during assembly thereof in order to avoid trapping one another.</p>	2	2	4
	Use of tools	Entrapment							
	Repetitive movements	Knocks Cuts.							
	Falling objects.	Blows to, collisions with, entrapment of, knocking down workers	3	4	12	Overlapping works are forbidden. There must never be other workers not partaking in this part of the process on upper levels (if permitted in the nacelle)	1	4	4
	Disorder and lack of cleanliness.	Same-level falls	3	3	9	<p>Keep the work area clean and orderly, enabling mobility therein and avoid accumulating material in passageways.</p> <p>Keep passageways free of oils and other substances that may cause the ground to become a slipping hazard.</p>	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Assembly of the service lift: Hoisting material (cable coils, eyebolts, nuts and bolts) using the service crane	Shifting loads Falling material Breakage of hoisting elements and falling load	Blows to, collisions with, entrapment of, knocking down workers	3	4	12	All hoisting tools must be inspected prior to use, and all equipment must bear the CE Marking and conformance certificate. Remove possible loose parts before hoisting. Use protective equipment, hard hats and safety boots, as well as high-visibility vests at all times. All staff involved in handling the material with the pulley must be in direct contact with each other. No staff must be positioned under the load. Service cranes must be used by qualified staff with a crane-operating license. The inspections relevant to the service crane's regulations must be up-to-date. Staff not involved in said task must be located outside of the working areas. Loads must not be hoisted outside with wind speeds that exceed 15 m/s.	2	2	4
Assembly of the service lift: Lowering material from the nacelle to the service lift's upper platform	Falling material Hoisting equipment breaking	Blows to, collisions with, entrapment of, knocking down workers	4	4	16	Material must be lowered in a controlled fashion, either using ropes with a munter hitch, or via a portable internal crane. Overlapping works are forbidden. Therefore, there must never be other workers not partaking in this part of the process on lower levels of the machine. Use protective equipment such as hard hats, safety gloves and boots at all times. Use tool bags in order to avoid tools being dropped. Remove all possible loose parts before lowering the material.	1	4	4
Assembly of the service lift: Securing the guide cable, through cable, safety cable and stop plate in the upper part of the towers	Working on a ladder	Falls from height	3	5	15	The operators responsible for securing the guide cables, through cables and safety cables to the beam in the upper part of the tower must be equipped with double anchoring fall systems, to secure it to the wind turbine's structure.	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Material falling during handling thereof	Blows to, collisions with, entrapment of, knocking down workers	3	4	12	Overlapping works are forbidden. Therefore, there must never be other workers not partaking in this part of the process on lower levels of the machine. Use protective equipment such as hard hats, safety gloves and boots at all times. Use tool bags in order to avoid tools being dropped.	1	4	4
Assembly of the service lift: Lowering the cable to lower platforms	Material falling during handling thereof	Blows to, collisions with, entrapment of, knocking down workers	3	4	12	Overlapping works are forbidden. Therefore, there must never be other workers not partaking in this part of the process on lower levels of the machine. Use protective equipment such as hard hats, safety gloves and boots at all times. Use tool bags in order to avoid tools being dropped. Cable must be lowered in a controlled fashion, either using ropes with a munter hitch, or via a portable internal crane.	1	4	4
Assembly of the service lift: Installation of wire fix in the in the platforms support	Material falling during handling thereof	Blows to, collisions with, entrapment of, knocking down workers	3	4	12	Overlapping works are forbidden. Therefore, there must never be other workers not partaking in this part of the process on lower levels of the machine. Use protective equipment such as hard hats, safety gloves and boots at all times. Use tool bags in order to avoid tools being dropped.	1	4	4
	Work performed close to the elevator's hole	Falls from height	3	5	15	When securing the guide cables to the bases of the intermediate platforms, the operator must use an anti-fall system attached to a fixed anchoring point via a rope with an absorber.	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Assembly of the service lift: Securing the guide cable at ground level	Tightening the guide cable with manual tools	Becoming trapped, knocks due to dropping tools, cables or tensors breaking	2	3	6	A tripod will be used under the tower's lower platform as an anchoring point, pursuant to the assembly instruction manual, tightening it manually. The wrenches used for such tightening must be suitable for the movements of the nut caused by the tension. The cable must be tightened to the manufacturer's specification. Use of protective gloves is mandatory during this procedure.	1	2	2
Assembly of the service lift: Connection to the power grid	Electrical risk	Serious damage cause by contact with power lines Material damages	2	5	10	Connections to the wind turbine must be performed pursuant to the service lift's installation manual, and always by trained staff authorized by their employer to do so. Such staff must perform the connection to the circuit when it is de-energized, ensuring prior to connection that there is no energized source of voltage therein or nearby. This circuit must be protected by a fuse and a 30 mA grounding system.	1	5	5
Assembly of the service lift: Service Lift power supply	Power failure	Material damages	2	2	4	Press the emergency stop button and check the different stop switches and the Blocstop cable are connected to the power supply panel according to their color coding before connecting the plug to the socket.	1	2	2
Assembly of the service lift: Installation of the through cable in the TIRAK	Rotating elements	Entrapment Knocks Cuts.	2	3	6	Once we have fed the cable through the roof in the TIRAK's opening, when pressing the UP button to feed the cable in the TIRAK, we must keep hands away from this area to prevent them from becoming trapped by the cable. Moreover, we must continue to feed the cable through the wheels, front and rear guides and rear panel so that it exits through the rear of the cabin. Use of protective gloves is mandatory during this procedure.	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Assembly of the service lift: Installation of safety cable in the BLOCSTOP locking device	Handling cable	Entrapment Knocks Cuts.	2	2	4	Use of protective gloves is mandatory when feeding the cable through the roof and the BLOCSTOP to the guide until it exits via the rear panel.	1	2	2
Assembly of the service lift: Assembly of the counterweight on the through cable	Handling the counterweight	Overexertion. Knocks Cuts.	2	3	6	The maximum weight to handle manually must not exceed 25 kg. If the weight exceeds this, the help of another worker or mechanical means are required. Occasionally, practiced workers can lift up to 40 kg. Bend at the knees when lifting loads. Avoid turning your spine when handling loads. Try to hold the load tightly. Organize the movements of the components with your colleague during assembly of this component in order to prevent becoming trapped, the counterweight falling, etc.	1	2	2
Assembly of the service lift: Assembly of the safety cable anchoring	Attaching the guide cable to the spring	Entrapment	2	2	4	Protective gloves must be used when attaching the safety cable to the spring to prevent possible, knocks, becoming trapped and cuts when handling and using manual tools.	1	2	2
Assembly of the service lift: Use	Malfunctioning Inappropriate use	Miscellaneous	2	4	8	The service lift must be inspected by a trained member of staff pursuant to the manufacturer's instructions once it has been completed and prior to the first use thereof. Once the inspection has been performed by the trained member of staff, the person who is going to use the lift must also inspect it. The person that is going to use the lift must have read and understood the user manual and how the lift works. During use thereof, the person must be equipped with an anti-fall system with a double absorber. The service lift must not be used to go faster than 12 m/s.	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Preparation for start-up	Lack of knowledge about the work to be performed	Different types of injury	2	5	10	For safety reasons, at least two persons must be present during any start-up procedure. Staff must be trained in and familiar with the VESTAS safety manual and have read and understood Appendix I of the Health and Safety Plan referred to in such plan. Special care must be taken in situations where work is performed and measurements are taken in energized switchgears, distribution boards and connection boxes. No staff must be present in the wind turbines and the proximity of the medium voltage when it is connected to the grid.	1	3	3
		Electrical risks	2	5	10	Check that the plastic has been removed from the T53 transformer. Electrical hazard posters must be used and a check must be performed to ensure no staff remain in the wind turbine until when the power lines and the turbine's transformers are connected to the grid.	1	2	2
	Lack of staff training for the performance of jobs in the presence of an electrical hazard.	Electrical risks	2	5	10	Staff connecting the power lines must be trained pursuant to RD 614/2001 (Royal Decree) regarding minimum provisions for health and safety protection for employees facing electrical hazards. All electrical checks and connections that need to be performed must be performed by authorized staff pursuant to the aforementioned RD.	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Not using PPEs	Electrical risks	2	5	10	Staff that are to perform the connection to the grid must use the following protective equipment when working in the switchgears (Except when procedures are performed in a vacuum): <ul style="list-style-type: none"> • Insulating gloves suitable for the voltage that is going to be handled (Working tensions of 20000V) • Hardhat with dielectric face screen • Isolating mat or carpet suitable for the voltage that is going to be handled (Working tensions of 20000V) • Lifesaver pole • Approved isolated tools 	1	3	3
Connection of the power lines to the grid	Not following the electrical protocol	Electrical risks	2	5	10	Following the procedure's protocol	1	2	2
Connection of the first wind turbine to the grid	Not following the electrical protocol	Electrical risks	2	5	10	Following the procedure's protocol	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Start-up: Commissioning	Lack of preconditions for the start-up	Different types of injuries due to uncontrolled operation	2	4	8	<p>The blades must be feathered and locked with locking bolts.</p> <p>The rotor locking system must not be locked when the wind turbine is ready for start-up, but should be when staff enter the hub.</p> <p>Location of Emergency Stop Buttons:</p> <ul style="list-style-type: none"> - Main Shaft - Pitch system - Nacelle controller - Lower controller (ground c.) <p>When the emergency stop button is activated there is no electricity in the contactor's solenoids, the blades become feathered and the brake is activated.</p> <p>The "TRIP F60" button is found on the nacelle's controller and by pushing it, it disconnects the high voltage, rendering the entire wind turbine de-energized.</p> <p>The S952 is only available when the control unit is connected to the electric current (via the Q15, Q16 and F35 circuit breakers)</p> <p>The service lift must be equipped with an emergency stop button that will only be used for such service lift. The wind turbine's other emergency stop buttons will not stop the lift.</p> <p>The internal crane will be equipped with its own emergency stop button.</p>	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
		Electrical risks: <ul style="list-style-type: none"> • Explosion • Fire • Burns 	2	4	8	The main circuit breaker of the F60 grid must be open. The high-voltage grid must be connected to the T53 high-voltage transformer in the correct order (L1, L2, L3) The transformer's space must be locked. The Q8 in the busbar section must be turned off and locked with its own padlock. The Q7 in the busbar section must also be deactivated. The Q15 (Aux) must be deactivated and locked with its own padlock. The Q16 (Controller) must also be deactivated. All the circuit breakers of the two fuse sections must be switched off. All the nacelle's cables must be correctly connected to the units in the lower part of the tower. During procedures and checks in the switchboards and connection boxes the following protective equipment must be used (unless there is proof that the facility has been de-energized during the procedure): <ul style="list-style-type: none"> • Insulating gloves (Working tensions of 1000V) • Face shield • Insulating carpet Furthermore, calibrated measuring equipment must be used that is suitable for the voltage that is being worked with.	1	3	3
	Arc detection service	Electrical Shock	2	4	8	The terminals must have a rated power of 300 V DC.	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
		Electrical risks: <ul style="list-style-type: none"> Explosion Fire Burns 	3	4	8	Once it has been checked, it must be connected to the grid in compliance with the relevant protocols.	1	3	3
	Checking of the supply to the hub	Electrical risk Entrapment	2	4	8	Ensure the Q8 and Q7 circuit breakers are open and locked so that the generator and the converter do not receive electricity. To access the hub the rotor must be locked.	1	3	3
	Posture requirements Manual handling of loads	Overexertion. Entrapment Knocks Cuts.	3	3	9	Do not perform activities requiring demanding postures for prolonged periods of time, rotating with colleagues and taking breaks. Place all the material that will be needed when the nacelle is erected inside the nacelle. Use portable lifting equipment such as pulleys to lift and handle heavy material inside the nacelle. Be particularly careful when moving material, always avoiding positioning one's body between the material handled and the structure.	1	2	2
	Safety functions failure	Miscellaneous	2	4	8	Checking the emergency stop buttons: Check that the K932 contactor is not activated while in emergency mode. Press the emergency stop button, acknowledge the error by pressing * on screen 1 and check that S903 EMC changes to +	1	3	3
Commissioning without connection to the grid using an eclectic generator (Pre-commissioning)	Hoisting of elements Working under the turbine	Objects falling from the wind turbine or hoisted elements	4	5	20	Signal and demarcate the area under the wind turbine where there is a risk of items falling from the suspended cable. In hoisting and lowering operations the preventive technician must ensure no staff are present in the danger area.	2	4	8

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Connecting and disconnecting the portable transformer and switch board	Direct or indirect electric contract	4	5	20	Only an "authorized" worker must connect and disconnect the generator, portable transformer and switch boards, adhering to the electrical hazard protocols. All connections and disconnections must be performed with when there is no voltage. The electrical cupboard must be locked with a key.	1	5	5
	Unlocked electrical contacts	Direct electrical contacts	3	5	15	The contactors indicated in the WKI must be locked using locking devices	1	5	5
	Electric hazard in the portable transformer due to presence of water/humidity	Electrical discharges	3	5	15	The portable transformer must be positioned on a support to prevent it from being in direct contact with the ground. It must be equipped with an electrical hazard pictogram. An insulating mat must be installed in front of the transformer so that the "authorized" operator works on it.	1	5	5
	Hoisting load	Hoisted loads falling	4	5	20	To hoist the cable (both hoisting and lowering), metal sheet and tool bag and hoisting kit with three independent chains/claws. Hooks shall be equipped with safety latches.	2	4	8
	High wind speeds	Cable falling	3	4	12	Hoisting of the cable must be suspended if the wind speed or gusts of wind place the operation in danger. The external cable must be dismantled if it moves excessively during the procedure due to the wind.	2	3	6

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Suspended cable	Cable falling	2	5	10	The cable must hang from the bridge crane's beam using appropriate hoisting elements that must be inspected prior to use	1	5	5
	Fatigue of the elements	Cable falling	3	4	12	The external cable must be dismounted at the end of the working day, it must not be left for the following day.	1	3	3
	Cable coiling around the tower	Electric risk due to cable breaking. Cable falling.	3	5	15	The cable must not be able to coil itself around the tower. When turning the nacelle, the "authorized worker" must check that no mechanical traction is exercised on the cable.	1	5	5
	Breaking of/damage to the cable or its support mesh	Cable falling Electrical risk	3	5	15	Protective equipment must be installed near to the cable to protect it from possible damage produced in the nacelle's lower vents	1	3	3
	Metal sheet falling	Falling objects.	2	5	10	The positioning shafts for the metal sheet must be installed to prevent it from moving/falling	1	5	5
	Working with the lower vent open	Falls from height	3	5	15	The worker(s) located in the nacelle with the internal crane's vent open must be secured by means of a lanyard	1	5	5

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Lowering the cable	Cable falling	3	5	15	When lowering the cable no worker must remain within the danger area. Cable must be collected by at least two people, one who will guide the cable and the other who will place it in the box.	2	4	8
Repair and inspection work using the lifting platform <ul style="list-style-type: none"> Use of the platform 	Crane overturning and a lack of control over loads due to inappropriate use of the crane.	Entrapment, knocks, etc., due to falling objects, or lack of control thereof.	3	5	15	The lifting platform can only be used by qualified personnel; in other words, individuals who have received specific training on operating these types of equipment. Moreover, the supplying company must provide guarantee that the platform's relevant checks are up-to-date. To this end, the rental company of these platforms shall guarantee the suitability and proper condition of the platforms, delivering documents that prove the relevant inspections have been made and the qualifications of the operators driving them in accordance with Vestas internal procedure 04.06.00 Coordination of activities with subcontracted companies.	1	3	3
	Material becoming loose when handled on the platform Platform overturning	Falling load on employees Entrapment Knocks	3	5	15	Keep individuals not involved in the operations out of their range of action. Set out beacons in the working area and prevent people and vehicles from accessing it while work is performed. All staff on the platform must be in direct contact with the other and the employees involved in the procedures. All employees must use a safety helmet and boots, reflective vest and mechanical protective gloves.	1	3	3
	Runaway rotor	Falling from a different level Knocks Entrapment	2	5	10	The wind turbine's rotor must be locked mechanically (using a hydraulic shaft system) before performing jobs from the crane. To turn the rotor, the crane must be completely removed.	1	5	5

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Excessive wind speed Turbulent wind	Falling from a different level Knocks Entrapment	4	5	20	The maximum wind speed for work on the platform is an average of 10 m/s over 10 minutes (the specific data in the regulations document for the use of buckets is reduced by 2 m/s) Work must be suspended in the event of turbulent wind. Workers may suspend the work if they believe that the staying in the bucket/platform is dangerous, even if the wind speed is within the safe limits.	1	5	5
	Lack of knowledge about rescue and evacuation tasks on platforms.	Very serious personal risks due to inappropriate action taken in the event of an emergency	3	5	15	When work is done inside the platform, at least two employees holding valid training certificates in evacuation and rescue from heights must be present. Rescue and evacuation equipment must be available both on the platform and in the nacelle.	1	2	2
	Inappropriate use of the PPEs	Falling from a different level	3	5	15	Each of the workers on the platform must use a lanyard with an absorber attached to an approved point on the platform. The lanyard must be no longer than 2 meters. The use of intermediate anchoring elements is prohibited (e.g. Slings, joining to lanyards, etc.)	1	4	4
Repair and inspection work using the lifting platform <ul style="list-style-type: none"> Painting the towers (with a roller or paint sprayer) 	Sanding	Inhaling particles and the projection thereof into eyes	5	3	15	Using particle filter masks and safety goggles	2	2	4
	Handling paints and solvents	Absorbing hazardous chemical products through the skin	5	3	15	Using disposable protective clothing that is resistant to chemical products	1	3	3
		Inhaling hazardous chemical products	5	3	15	Using a respiratory protection mask against organic vapors	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
		Lack of knowledge about the hazards and preventive measures	4	4	16	A printed copy of the safety sheets must be available and the safety measures must be specified therein must be applied	1	2	2
Repair and inspection work using the lifting platform <ul style="list-style-type: none"> Blade repair procedures 	Sanding	Inhaling particles and the projection thereof into eyes	5	3	15	Using particle filter masks and safety goggles, as well as work overalls, to avoid the fiberglass contacting the skin.	2	2	4
	Handling epoxy resins and fiberglass	Absorbing hazardous chemical products through the skin	5	4	20	Using nitrile gloves. Using disposable protective clothing that is resistant to chemical products	2	3	6
		Inhaling hazardous chemical products	5	3	15	Using a respiratory protection mask against organic vapors	1	3	3
		Lack of knowledge about the hazards and preventive measures	4	4	16	A printed copy of the safety sheets must be available and the safety measures must be specified therein must be applied	1	2	2
Installation of the SCADA system <ul style="list-style-type: none"> Installation of the Patch Panel. Cabling and installation of the cupboard 	Inappropriate use or poor state of repair of the manual tools to drill the wall and hang the Patch Panel.	Becoming trapped, knocks, cuts	2	3	6	Use mechanical protective gloves and check the tools are in good condition prior to using it. Use the appropriate tool for the task to be carried out.	2	2	4

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Demanding postures due to the passing of cables through the technical ground. Holes in the ground when removing boards from the ground.	Overexertion due to strained postures. Possible tripping and same-level falls. Bumps against fixed parts.	2	3	6	Pay attention to fixed parts and holes left in the ground when moving boards. Avoid strained postures.	2	2	4
Installation of SCADA system <ul style="list-style-type: none"> Connection of the MV cables from the park to the substation's switchgears. 	Inappropriate cabling that may cause subsequent failures. Inappropriate use or poor state of repair of the manual tools.	Explosion, fire when starting up.	2	3	6	The equipment supplier's instructions must be followed. The ends of the cables must be prepared with special materials that favor rigidity and insulation (caps), avoiding future problems involving wear and deterioration of the insulation. Use mechanical protective gloves and check the tools are in good condition prior to using it. Use the appropriate tool for the task to be carried out.	2	2	4
	Demanding postures due to the passing of cables through the technical ground. Holes in the ground when removing boards from the ground.	Overexertion due to strained postures. Possible tripping and same-level falls. Bumps against fixed parts.	2	3	6	Pay attention to fixed parts and holes left in the ground when moving boards. Avoid strained postures.	2	2	4
	Inappropriate connection of the ends of the cable conductors, not providing sufficient protection. Inappropriate use or poor state of repair of the manual tools.	Risk of thermal contact with the machine or plastic material and consequently of burning. Explosion, fire when starting up.	2	3	6	The ends of the conductor cables must not be bent to avoid distortion of the electric field's lines that over time will damage the cable's insulation. Check the materials and tools are in a good state of repair prior to starting. Install the insulation caps avoiding contact between the hot parts of the clamping machinery and the cap's material. Use mechanical and thermal protective gloves.	2	2	4
Installation of the SCADA system <ul style="list-style-type: none"> Installation of the GRID PANEL 	Demanding postures due to the passing of cables through the technical ground. Holes in the ground when removing boards from the ground.	Overexertion due to strained postures. Possible tripping and same-level falls. Bumps against fixed parts.	2	3	6	Pay attention to fixed parts and holes left in the ground when moving boards. Avoid strained postures.	2	2	4
Installation of the SCADA system <ul style="list-style-type: none"> Installation of the GRID PANEL 	Inappropriate use or poor state of repair of the manual tools used to secure the panel and cable support to the wall.	Becoming trapped, knocks, cuts	2	3	6	Use mechanical protective gloves and check the tools are in good condition prior to using it. Use the appropriate tool for the task to be carried out.	2	2	4

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Heavy weights	Overexertion when lifting the cupboard to fix it to the wall.	3	3	9	Two workers must handle the cupboard when fixing it to the wall.	2	2	4
Installation of SCADA system <ul style="list-style-type: none"> Installation of the server, antennas and connections 	Handling the load with mechanical means (pallet truck). Risk of bumps with fixed and moving parts, tripping, overexertion when loading the equipment.	Risk of bumps with fixed and moving parts, tripping, overexertion when loading the equipment.	3	3	9	Various people must take part when unloading and moving the equipment. Coordinate the procedures among the workers. Pay attention at all times to the equipment and state of the ground upon which it circulates. Take care when entering so as to not slip or trip. Wear mechanical protection gloves.	2	2	4
	Inappropriate use or poor state of repair of the manual tools used to secure the antenna and cable support to the wall.	Becoming trapped, knocks, cuts	2	3	6	Use mechanical protective gloves and check the tools are in good condition prior to using it. Use the appropriate tool for the task to be carried out.	2	2	4
	Use of ladders involving risk of falling from heights.	Different-level falls	3	4	12	The basic rule is to not use a ladder to work. If necessary, and provided that using a work platform is not possible, the following measures must be adopted. If your feet are more than 2 m off the ground, use a safety belt secured to a solid and resistant point. Secure the upper end of the ladder. If the work are to last a certain period of time, devices such as footrests can be used, which will be attached to the ladder. Only one person must use the ladder to work. Maintain at least 5 m from a HV power line and if a ladder must be used, use insulated fiberglass ladders. Rest the ladder firmly on a flat surface.	1	4	4
	The server must be powered at 220 V. Risk of low voltage electrical contact.	Risk of low voltage electrical contact.	2	3	6	Check the condition of the power outlet and the server cable and then connect them.	1	3	3


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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Connections when near to energized sources	Electrical contacts	2	4	8	When working in energized electric cabinets, the active parts of the cabinet must be protected, and they must also use dielectric gloves, which are insulated in accordance with the voltage present.	1	3	3
Installation of SCADA system <ul style="list-style-type: none"> • Checking the connection between the server and the machines. 	Access to turbines to check the connections.	Miscellaneous	–	–	–	Take the corresponding measures in this risk assessment	–	–	–


TASK No.2 Supply and installation of meteorological tower

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Assembly of the meteorological tower Assembly of the tower, controlgear and switchgear and lifeline on the ground	Movement on the ground	Same-level falls	3	4	12	The tower must be assembled at ground level. The work area's ground conditions must be examined before work commences. If the area is found to be uneven or in a disorderly condition, inform the person in charge or signal and/protect such zones that at the time are not level or are irregular. Take special care to watch where one is stepping. Avoid running.	1	2	2
	Handling heavy elements Use of tools Repetitive movements	Overexertion. Entrapment Knocks Cuts.	2	3	6	The maximum weight to handle manually must not exceed 25 kg. If the weight exceeds this, the help of another worker or mechanical means are required. Occasionally, practiced workers can lift up to 40 kg. Bend at the knees when lifting loads. Avoid turning your spine when handling loads. Try to hold the load tightly. Use mechanical tools to tighten bolts, nuts and screws. Organize the movements of the components during assembly thereof in order to avoid trapping one another.	2	2	4
	Tower overturning on the ground.	Blows to, collisions with, entrapment of, knocking down workers	3	4	12	The tower will then be stabilized on the ground, resting it on polystyrene boards that prevent it from moving and overturning.	1	4	4
	Disorder and lack of cleanliness.	Same-level falls	3	3	9	Keep the work area clean and orderly, enabling mobility therein and avoid accumulating material in passageways. Keep passageways free of oils and other substances that may cause the ground to become a slipping hazard.	1	2	2

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
Assembly of the Meteorological tower: Hoisting of the tower	Shifting loads Falling material Breakage of hoisting elements and falling load	Blows to, collisions with, entrapment of, knocking down workers	3	4	12	All hoisting tools must be inspected prior to use, and all equipment must bear the CE Marking and conformance certificate. An additional crane to the hoisting crane shall be used as a guy. Remove possible loose parts before hoisting. Use protective equipment, hard hats and safety boots, as well as high-visibility vests at all times. All staff involved in moving the tower with the crane must be in direct contact with each other. No staff must be positioned under the load. Tag lines must be attached to the base of the tower to guide it to the foundation in order for workers to be able to keep a safe distance during manipulation thereof. Cranes must be used by qualified staff with a crane-operating license. The inspections relevant to the crane's regulations must be up-to-date. Staff not involved in said task must be located outside of the working areas. Set out beacons at locations where people may be able to access the work area in order to prevent them from doing so. The load must not be hoisted with wind speeds that exceed 10 m/s (10 min. average.).	1	3	3

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Crane overturning and a lack of control over loads due to inappropriate use of the crane.	Entrapment, knocks, etc., due to falling objects, or lack of control thereof.	3	5	15	The crane can only be used by trained staff, in other words, staff that have received specific training to drive said vehicles. Moreover, the supplying company must provide guarantee that the crane's relevant checks are up-to-date. To do so, they shall deliver the documents that prove the corresponding revisions and qualifications of the operators driving such equipment. The company supplying the crane must acknowledge and comply with the precautions set forth in the appendix document “ Self-propelled Mobile Crane Safety Manual ”. A second person inside the cabin is forbidden. The worker must wear a hard hat, safety boots and a reflective vest when stepping out of the cabin. The use of mobile telephones during operation of the crane is prohibited.	1	3	3
Assembly of the Meteorological tower: Releasing the tower from the crane, assembling the new controlgear and switchgear, and retightening the bolts	Tower collapsing	Entrapment Blows to, collisions with, entrapment of, knocking down workers	3	5	15	The crane must not be released until the foundation's bolts have been completely tightened.	1	4	4
	Climbing the tower	Falls from height	3	5	15	Staff accessing the wind turbine must use the relevant anti-fall system, composed of safety harness, anti-fall device with a suitable automatic lock for the SÖLL lifeline. for vertical movements and a double absorber for horizontal movements thereof. Lifelines must not be used unless they have duly certified by qualified staff. In this case, an anti-fall system with a double absorber must be used at all times. Inform the crane operator of the intention to climb so that they crane is kept in a fixed position, thus avoiding any uncontrolled movements whilst climbing.	1	5	5

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Work area, equipment or functioning	Hazard	Risk	L	S	R	Preventive Measures	L	S	R
	Movements of the structure Use of manual tools	Overexertion.	3	3	9	Take turns with your colleague when performing jobs that require great physical effort, demanding postures, as well as repetitive movements. Select the appropriate tools. Use machines and tools as indicated in the manuals.	2	2	4
	Material falling during handling thereof	Blows to, collisions with, entrapment of, knocking down workers	3	4	12	Overlapping works are forbidden. There must never be other workers performing tasks on the same vertical side. Use protective equipment such as hard hats, safety gloves and boots at all times. Use tool bags in order to avoid tools being dropped.	1	4	4
Assembly of the meteorological tower: Connection to the power grid	Electrical risk	Serious damage cause by contact with power lines Material damages	2	5	10	The connection to the grid of the tower's controlgear and switchgear must be performed pursuant to the installation manual thereof, and by staff trained and authorized by the company to which they are employed. Such staff must perform the connection to the circuit when it is de-energized, ensuring prior to connection that there is no energized source of voltage therein or nearby.	1	5	5

HEALTH AND SAFETY PLAN BOP

Module V Emergency Plan

**WIND FARM ENERGÍA EÓLICA DEL SUR- POLÍGONO
JUCHITÁN**

IN JUCHITÁN DE ZARAGOZA, OAXACA, MÉXICO.

Rev.	Description of changes (include modified section numbers)	Revised by	Approved by
00	First edition	ALAIB MMRMU	OSCDU
01	Extension of the scope of the document to wind turbine installation projects and corresponding modifications	QSE Spain	MMRMU
01	Modification of the structure and responsibilities of emergency teams	QSE Spain	MMRMU

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1 OBJECT

The object of this emergency plan is to establish a series of organisational, operational and material measures to guarantee the safety of individuals and property within the wind farm.

These measures include operational mechanisms in the event of an emergency, adapted to the circumstances of each case.

2 FIELD OF APPLICATION

Scope: Projects involving the installation of wind turbines and maintenance of wind farms.

This emergency plan applies to the following cases:

- Workers of VESTAS and its subsidiaries (hereinafter, VESTAS) at wind farms where performing work for which they are responsible.
- Workers performing work at the wind farm and directly answerable to VESTAS (sub-contracted by VESTAS)
- Visitors for whom VESTAS is responsible.

3 TRAINING

Visitors: Application of Procedure [MED BP 04.05.00 Visits to Wind Farms](#)

All VESTAS workers or sub-contractors operating at a wind farm must have training in the following fields:

- Risks and prevention measures for their position of employment
- Risk assessment [MED SP GRA 200 Wind Farm](#)
- Wind Farm Emergency Plan

If working at height, this training must be supplemented by the following specific training:

- Risk Assessment [SP HS GRA 307 Service Technician](#)
- Rescue and evacuation
- First aid
- Fire extinguishers

The requirement for specific training will not apply in the following case:

- Staff of VESTAS or sub-contractors performing occasional work supervised by VESTAS staff, provided that they are accompanied by at least two qualified VESTAS workers.

4 MEANS AVAILABLE TO CONTROL EMERGENCIES

4.1 Fire fighting means

- Wind turbine: one 89B rated extinguisher, located in the gondola.
- Vehicles: two minimum 89B rated extinguishers.

4.2 Rescue and evacuation equipment

- Wind turbines:
 - Power greater than 1 MW: rescue and evacuation equipment in place on the gondola.
 - Power less than 1 MW: no rescue and evacuation equipment in place.
- Vehicles: When accessing wind farms which do not have fixed rescue equipment on the wind turbine, they must have mobile rescue and evacuation equipment.

4.3 Communication equipment

Each working crew comprising at least two qualified individuals must have the following equipment:

- 2 walkie-talkies
- 1 mobile telephone

4.4 Means for containment of environmental emergencies

Each team working on the wind turbine or the corresponding facilities must have the following equipment:

- In vehicles: elements to absorb small spillages.
- At the sub-station, maintenance unit or works huts: elements to absorb major spillages.

4.5 Operational means for first aid

- Each OMS vehicle must have a portable first aid kit, inspected and with the contents specified in the operational control table. In the case of installation projects, the portable first aid kit should be located in a works hut accessible to all Vestas and sub-contractor staff.

4.6 Operational means provided by sub-contractors

- Each working crew comprising sub-contracted staff must have in place operational means for emergencies in accordance with the risks generated by their activities. In each case these means must be listed in the applicable risk assessments.

5 EVACUATION ROUTES INSIDE A WIND TURBINE

Inside a wind turbine the following evacuation routes exist:

- Steps via the tower.
- Lift via the tower.
- Evacuation equipment routed outside the tower.

6 GENERAL OPERATIONAL REGULATIONS IN EMERGENCIES

- Keep calm and avoid panic.
- Attempt to protect oneself and colleagues
- Alert other staff who could be affected by the emergency
- If we feel that we can control the emergency, combat it with the means available, and if this cannot be achieved, abandoned the attempt and seek safety.
- Evacuate the wind turbine
- Establish a 300 metre security perimeter
- The Emergency Head should notify the outside emergency services (civil protection force, fire brigade, Red Cross, etc.)

7 OPERATIONAL REGULATIONS IN CASE OF FIRE

- Follow general emergency regulations
- If the fire breaks out at the base of the wind turbine and workers are present in the gondola, evacuation should take place outside using the external rescue equipment.
- If the fire breaks out at the base of the wind turbine and workers are present in the tower, they should ascend as quickly as possible to the gondola and evacuate outside using the rescue equipment.
- If the fire breaks out in the gondola or the blades, the wind turbine should be evacuated inside using the tower steps. The lift may not be used in this situation.
- If a carbon dioxide (CO₂) fire extinguisher is used in an enclosed space (tower, gondola, blades, drum), it must be remembered that the level of oxygen in the air will be reduced, and this could lead to asphyxiation of workers. In this case the compartment should be ventilated, and workers head outside to breathe fresh air.
- If possible, the high-tension switch connecting the wind turbine to the electrical grid should be switched using the TRIP F60 button. In the event that this would constitute a risk to workers, the entire line should be disconnected from the substation. These manoeuvres must be performed by qualified workers.

8 OPERATIONAL REGULATIONS IN CASE OF SPILLAGES

- Follow general emergency regulations
- Attempt to contain the spillage using absorbent materials.
- Notify the QSE Department and the wind farm owners of the incident.
- Prevent spillage from reaching streams, rivers, seas, etc.
- Clean up any spillage which could cause falls at the same/to another level, and in all cases mark the risk and treat waste in accordance with procedure [MED BP 30.02.02](#) and the site waste management guide.

9 OPERATIONAL REGULATIONS IN CASE OF UNCONTROLLED OPERATION

- Follow general emergency regulations
- Evacuate the wind turbine by the tower steps. Do not use the lift.
- If possible, disconnect the high-tension switch connecting the wind turbine to the electrical grid. In the event that this would constitute a risk to workers the entire line should be disconnected from substation. These manoeuvres must be performed by qualified workers.
- Establish a 500 metre security perimeter.

10 OPERATIONAL REGULATIONS IN CASE OF PERSONAL ACCIDENTS

- Follow general emergency regulations
- Apply first aid knowledge to assist the victim.
- If urgent specialist medical care is required, evacuate the victim using the external rescue equipment.
- In the event that moving the victim could cause severe permanent injury, immobilise and wait for the medical services to reach the location. Following treatment, evacuation should take place.
- As a general rule, helicopter evacuation should not be employed directly from the wind turbine. If a victim requires air evacuation, he should be lowered down outside the wind turbine and then picked up by the emergency services helicopter. The coordinates of the wind turbines are to be found in the Appendix "Details of Interest" and in the operational outlines for each wind turbine.

The telephone numbers of the emergency services are to be found in Appendix II "Operational Outlines"

11 NOTIFICATION AND INVESTIGATION OF EMERGENCIES

The emergency must be notified to the owners and the authorities if required by the Head of Operations or Project Director.

Following conclusion of emergency procedures, the Emergency Head will notify the QSE Department and an investigation will be undertaken in order to establish the reasons and propose corrective actions.

The functioning of the emergency plan will likewise be assessed and, if necessary, it will be revised.

12 EMERGENCY TEAMS. FUNCTIONS AND RESPONSIBILITIES

Tasks are generally allocated to teams comprising at least two trained individuals, meaning that in each section there must always be a minimum of two individuals and a maximum number established in accordance with the task.

Prior to commencement of tasks, the supervisor will appoint one individual for each section to act as Emergency Head if required. A substitute will also be appointed to act in the event that the incumbent is the victim of an accident or is absent for any other reason.

The individual acting as emergency head will perform the functions of an emergency head and also those of a head of evacuation and intervention.

Functions of head of emergency / evacuation and intervention

Identify oneself as emergency head to the remaining workers prior to work commencing.

Ensure that the remaining workers are familiar with the emergency plan and in the event that any workers are not, hold an informative talk to explain the operational guidelines.

Take decisions, call the outside emergency services (112 phone line, fire brigade, civil protection force, civil guard, police, etc.) and coordinate wind farm staff.

Direct evacuation and rescue operations and organise technical and human resources during the emergency situation. Assume responsibility for establishing a security perimeter if required.

Notify the Head of Operations or Project Director of the emergency situation.

Once the emergency situation is under control, the QSE Department is notified, and the emergency head takes part in the investigation and furtherance of corrective measures.

Functions of first intervention and first aid teams

The functions of the first intervention and first aid teams may be performed by any workers who have received training in work at height, rescue, evacuation and first aid, under the instruction of the emergency head.

The functions are as follows:

Perform rescue and/or evacuation of individuals affected by the emergency and attempt to contain the situation with the means available.

Apply first aid to accident victims and transport or accompany them to the medical centre.

13 APPENDICES

APPENDIX I [Details of Interest](#) To be Define according to the WF site conditions.

APPENDIX II [Operational Outlines](#) To be Define according to the WF site conditions.