

Safety regulations for damage prevention in wind turbines, S940

Your obligation to prevent damage, Valid as of 1 January 2023

Welcome to read the protection guideline!

Your business has an obligation to prevent damage. In these safety regulations, we explain what your company must do and take into consideration to prevent property damage and business interruption losses to wind turbines.

ⓘ Read the regulations carefully. If you do not comply with the regulations, we may reduce or deny your insurance compensation.

These safety regulations are part of your insurance contract

Your insurance contract consists of the policy document, insurance terms and conditions, safety regulations, and the general contract terms and conditions.

The **policy document** lists your company's insurance policies and the terms and conditions applicable to them.

The **insurance terms and conditions** describe the terms under which your property is insured.

The **safety regulations** describe your company's obligations to prevent damage.

The **general contract terms and conditions** list terms that apply to all insurance policies issued by Pohjola Insurance.

We interpret the policy document, insurance terms and conditions, safety regulations, and general contract terms and conditions as a whole.



Policy document



Insurance terms and conditions



Safety Regulations
This document



General contract terms and conditions

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1 Purpose of the safety regulations: prevention of damage to wind turbines

The purpose of these safety regulations is to prevent property damage and business interruption losses to wind turbines and reduce the costs of such damage. The safety regulations describe the general requirements for damage prevention in wind turbines. Please note that the technical solutions of wind turbines are specific to each manufacturer.

These safety regulations apply to wind turbines supplying the electrical grid with a rated power of 1 MW or greater.

Your business has an obligation to ensure that

- ✓ the safety regulations are followed in all activities carried out by the policyholder or its equivalent
- ✓ those responsible for performing the work are familiar with the contents of the safety regulations.

❗ The design of the wind turbine must be based on the International Electrotechnical Commission (IEC) standard 61400 Wind turbines.

2 Overview

Standard IEC 61400 specifies the wind conditions at the site of installation, the main systems and subsystems of the wind turbine, the mechanical and electrical properties of the wind turbine generator, the tower and foundation of the turbine, the controls and regulation systems of the turbine, the communication and monitoring systems of the turbine, connecting the turbine to the grid, and environmental impacts of the turbine.

- ✓ **Ensure** that the wind turbine has a certificate of conformance with standard 61400 issued by an accredited certification body.

- The certificate of conformity must be based on the document IEC WT; IEC Systems for Conformity Testing and Certification of Wind Turbines, Rules and procedures.

- ✓ **Ensure** that the wind turbine is suitable for all conditions at the site of installation.

3 Requirements for the transport of wind turbines

ⓘ Ensure that transport is performed in accordance with a transport plan drafted on the basis of the wind turbine manufacturer's transport manual.

- ✓ **Ensure** that the company responsible for transporting the wind turbine components has a transport plan that specifies how the selected route is suitable for transporting wind turbine components.
- ✓ **Ensure** that transported components are protected against mechanical and environmental load.
- ✓ **Ensure** that transported components are secured and supported in accordance with instructions.
- ✓ **Inspect** all components immediately at the assembly site for damage during transport.
- ✓ **Repair or replace** components damaged in transport before use in accordance with the manufacturer's instructions

4 Requirements for the assembly of wind turbines

ⓘ Ensure that assembly, erection and installation of the wind turbine is performed in accordance with the manufacturer's assembly instructions.

- ✗ **Ensure** that the assembly is not performed in environmental conditions that differ from the permitted values for the wind turbine or its assembly device.
- ✓ **Ensure** that the assembly of the wind turbine is directed by a person authorised by the turbine manufacturer.
- ✓ **Request** documentation of the assembly.
- ✓ **Ensure** that the assembly documentation describes the following:
 - completed acceptance inspections
 - implementation of the assembly and installation
 - testing of safety systems, and
 - results of the starting value measurements.

5 Requirements for connecting a wind turbine to the grid

Protective system refers to a system designed to detect and prevent risk of loss or damage caused by the wind turbine's operation or by external circumstances.

- ✓ **Ensure** that the wind turbine and wind farm are equipped with protections required by the electrical grid operator.
- ✓ **Ensure** that the functionality of the protections is inspected before the wind turbine is connected to the grid and during operation in accordance with the maintenance programme.

6 Requirements for the preventive maintenance of wind turbines

⚠ Maintenance of wind turbines must be based on preventive maintenance.

Preventive maintenance refers to activities that maintain the wind turbine's functionalities, restore reduced functional capacity before the emergence of errors and reduce the risk of damage.

Preventive maintenance includes:

- monitoring of environmental conditions
- continuous monitoring of the condition of wind turbine systems, and
- periodic inspections and servicing.

⚠ Preventive maintenance must be based on a written maintenance programme prepared by the wind turbine's manufacturer or company responsible for maintenance.

The **maintenance programme** is a device-specific document on necessary measures related to preventive maintenance, including condition monitoring, inspections, testing, servicing, and operational monitoring.

The maintenance programme must describe the following activities:

- monitoring of environmental conditions
- continuous monitoring of the condition of wind turbine systems, and
- periodic inspections and servicing.

- ✓ **Ensure** that the company responsible for maintenance prepares a written maintenance programme if the manufacturer's maintenance programme is no longer valid.
- ✓ **Ensure** that the written maintenance programme covers the entire technical service life of the wind turbine.
- ✓ **Ensure** that the maintenance programme is always available to us in the event of loss or damage or for risk management meetings.
- ✓ **Notify** us in writing if a deviation endangering the operational reliability of equipment or systems is detected during inspections, testing or other activities. Report the deviation to us in writing before continuing the use of the equipment or system.
- ✓ **Obtain** a written approval from the equipment manufacturer or us if you plan to use repair methods that differ from those recommended by the manufacturer.

⚠ The wind turbine's equipment must be inspected in accordance with the maintenance programme prepared by wind turbine's manufacturer or company responsible for maintenance.

Inspection refers to investigating the functional capacity of the device or site. Inspection also involves testing to confirm that the device is functioning as intended.

- ✓ **Ensure** that inspections are performed by competent operating and maintenance personnel.
- ✓ **Ensure** that the maintenance programme includes at least the following inspections and measures and their schedules.

Sensory inspection:

- ✓ checking for oil or coolant leaks
- ✓ detecting abnormal activity
- ✓ detecting vibration
- ✓ detecting abnormal noise.
- ✓ inspection of rotor blades at least every two years
 - the inspection must be performed on the exterior along the surface of the blades and on the interior of the blade in sections accessible to the inspector.
 - the blades may not have cracks or signs of wear.

- ✓ **Ensure** that the following equipment and systems are in order and match the manufacturer's design values:

- gearboxes
- main shaft and main bearing
- lubricant and hydraulic oil system
- rotor blade brake and shutdown device
- transformer
- tower structure and foundation.

- ✓ **Measure** generators electronically.
- ✓ **Ensure** that if deviations from normal values are detected, the cause of the deviation is investigated with detailed nondestructive testing (NDT).
- ✓ **Ensure** that all detected defects are repaired before the wind turbine is started.
- ✓ **Ensure** that all maintenance measures (inspections, observations and service) are documented and available to us in the event of loss or damage and at meetings.

⚠ Ensure that servicing is carried out by the wind turbine's manufacturer or other competent maintenance personnel.

Servicing refers to periodic measures taken to maintain the functional capacity of the device or site, as well as measures taken after detection of an error to restore the device to its original functional capacity.

- ✓ **Ensure** that preventive and actual maintenance is carried out by authorised personnel.
- ✓ **Ensure** that maintenance measures are documented and available to us in the event of loss or damage and at meetings.
- ✓ **Ensure** that devices and components of the wind turbine that are near their maximum permitted operating hours are replaced as part of servicing.

7 Requirements for the operational safety of wind turbines

⚠ Ensure that the wind turbine has an up-to-date rescue plan in place at all times.

- ✓ **Update** the rescue plan whenever necessary and at least once a year.
- ✓ **Train** maintenance personnel on the rescue plan and safety instructions.
- ✓ **Ensure** that the wind turbine is equipped with up-to-date safety instructions and signage.
- ✓ **Ensure** that the safety instructions include detailed directions to the wind turbine or the turbine's GPS coordinates for reporting emergencies.
- ✓ **Ensure** that the wind turbine is accessible only to persons that have been designated by the wind turbine's owner or operator and received safety training.
- ✓ **Ensure** that persons designated by the wind turbine's owner or operator who have not received safety training access the wind turbine only under the supervision of a designated safety officer.
- ✓ **Ensure** that all persons who visit the wind turbine site wear appropriate personal protective equipment.
- ✓ **Ensure** that persons working in the wind turbine have access to an emergency evacuation device.
- ✓ **Ensure** that equipment bays are kept in good order and clean to ensure safety at work and prevent accidents.

8 Requirements for the controlled shutdown of a wind turbine

⚠ Shut down the wind turbine if an issue endangering the wind turbine's operational reliability is detected during operation or maintenance or by an inspection. Do not restart the wind turbine before the issue is addressed.

- ✓ **Ensure** that the wind turbine has a protective system that directs the wind turbine into a safe mode or automatically shuts down the turbine if operating values in continuous use differ from the permissible design values specified by the manufacturer.
- ✓ **Shut down** the wind turbine in a controlled manner, if
 - vibration severity exceeds the maximum permitted value specified by the wind turbine's manufacturer
 - a malfunction or error is detected in the wind turbine's rotor blades, main bearing, gearbox, generator, electrical system or other equipment or component of the turbine
 - the wind turbine's fire detection system issues a fire alarm
 - the wind turbine's fire extinguishing system is activated.

9 Requirements for protective and monitoring systems of wind turbines

Protective and monitoring systems refer to a system designed to detect and prevent risk of loss or damage caused by the wind turbine's operation or by external circumstances.

Lightning protection

- ✓ **Inspect and measure** lightning protectors at least every two years.
- ✓ **Measure** the protectors so that poor connections or partial disconnections in the arrester or poor contacts between sliding surfaces are detected.

Electrical installations and their thermal imaging

- ✓ **Ensure** that electrical installations are thermally imaged during test use and after deployment according to the maintenance programme.
- ✓ **Ensure** that electrical installations are thermally imaged at least every two years.
- ✓ **Ensure** that thermal imaging is documented.
- ✓ **Ensure** that inspections of electrical installations comply with official regulations in force at the time.

Electrical protections

The wind turbine and wind farm must be equipped with protections required by the electrical grid operator. The functionality of the protections must be inspected before the wind turbine is connected to the electrical grid and during operation in accordance with the maintenance programme.

- ✓ **Protect** the wind turbine with the following electrical protections:
 - over-voltage and under-voltage protectors that function to ensure that voltage remains within permitted limits
 - over-frequency and under-frequency protectors that function to ensure that voltage frequency remains within permitted limits
 - loss of mains protection that functions to prevent islanding of the wind turbine
 - generator overcurrent and ground-fault protectors and reverse power protector to shield the generator against short circuit and ground fault and prevent the generator from acting as a motor
 - generator stator temperature control that shuts down the generator when temperature exceeds the permitted limit.

10 Requirements for the prevention of breakdowns

Operational monitoring

Monitoring of environmental conditions

- ✓ **Measure** wind speed at all times.
- ✓ **Ensure** that the wind turbine's rotor blades stop automatically if wind speed exceeds the maximum permissible value specified by the manufacturer.
- ✓ **Ensure** that the wind turbine is equipped with at least two ice-resistant wind speed sensors.
- ✓ **Monitor** temperature and relative humidity in the engine room and ensure that they conform to the manufacturer's design values.

Condition monitoring

⚠ The control centre for communications on condition monitoring must be implemented in accordance with standard series IEC 61400.

Bearings

- ✓ **Ensure** that vibration severity and temperature of the main bearing and gearbox and generator bearings are monitored at all times.
- ✓ **Ensure** that temperature does not exceed the highest value permitted by the bearings' manufacturer.

Generator

- ✓ **Ensure** that temperature of the generator's stator is monitored at all times.
- ✓ **Ensure** that the temperature of the generator's stator does not exceed the highest permitted value specified by the generator's manufacturer.

Lubricant and hydraulic oil system

- ✓ **Ensure** that the oil level, pressure and temperature in the lubricant and hydraulic oil system are monitored at all times.
- ✓ **Ensure** that the values are within the permissible limits specified by the manufacturer.

11 Requirements for the prevention of fire damage

⚠ Due to fire safety reasons, smoking is prohibited in all areas within the wind turbine.

First-aid extinguishing equipment

- ✓ **Ensure** that the wind turbine's engine room is equipped with at least two frost-resistant hand-held fire extinguishers suitable also for extinguishing fires involving electrical voltage.
- ✓ **Mark** the locations of hand-held fire extinguisher in the safety plan.
- ✓ **Use** frost-resistant foam or water hand-held fire extinguishers, if possible.
- ✓ **Inspect** hand-held indoor fire extinguishers every two years.
- ✓ **Inspect** hand-held fire extinguishers stored outdoors or in facilities vulnerable to vibration every year.

Automatic fire extinguishing system

- ✓ The wind turbine's engine room must also be protected with an automatic fire extinguishing system when the turbine's rated power is 2 MW or greater.
- ✓ **Ensure** that the automatic fire extinguishing systems must be inspected monthly.
- ✓ **Document** the monthly inspections.
- ✓ **Immediately** repair any issues detected in the periodic inspections of fire extinguishing systems.
- ✓ **Ensure** that the automatic fire extinguishing system is a local application or a total flooding system.
- ✓ **Ensure** that changes in weather conditions are taken into account in the selection of fire extinguishing systems and agents.
- ✓ **Ensure** that advance warning and activation notifications of the fire extinguishing systems is sent in real time to the wind turbine's on-duty maintenance personnel and manned emergency response centre.
- ✓ **Notify** the emergency response centre without delay if the fire extinguishing system is activated.

Fire detection system

- ✓ **Ensure** that automatic fire detection systems must be inspected monthly.
- ✓ **Document** the monthly inspections.
- ✓ **Immediately repair** any issues detected in the periodic inspections of fire detection systems.
- ✓ **Protect** the wind turbine's engine room with a fire detection system when the turbine's rated power is 1 MW or greater.
- ✓ **Ensure** that the wind turbine is equipped with smoke and fire detectors and systems.
- ✓ **Ensure** that the fire detector used is a multi-sensor alarm. When the first alarm is activated, the wind turbine must shut down automatically and in a controlled manner. When the second alarm is activated or a fire is detected, the emergency response centre must be alerted and the turbine must be disconnected from the grid.
- ✓ **Ensure** that the connection to the alarm is equipped with a fault monitor.

Placement of fire detectors

- ✓ **Ensure** that fire detection system sensors are placed in a way that ensures that in the event of fire, the alarm is raised as early as possible.
- ✓ **Ensure** that the sensors cover all parts of the engine room and intermediary structures of the tower that may slow down the spread of smoke.

- ✓ **Ensure** that sensors are also placed inside electrical equipment cabinets.
- ✓ **Ensure** that ventilation of the engine room is taken into account in the placement of sensors.

Hotwork

- ✓ **Follow** the safety regulations for hot work, S621.
- ✓ **Perform** all hot work according to the instructions for temporary hot work locations.

Use of flammable liquids in maintenance

- ✓ **Ensure** continuous ventilation of the space In situations where highly flammable or flammable liquids must be used during maintenance work.
- ✓ **Clean** splashes of flammable liquids immediately.
- ✓ **Ensure** that when using liquids, discharges of static electricity do not cause ignition.
- ✓ **Remove** all unnecessary flammable materials used in maintenance work from the wind turbine immediately after the work has ended.

Other fire safety requirements

- ✗ **Do not store** unnecessary flammable material in the engine room.

12 Requirements for the prevention of vandalism

Doors

- ✓ **Ensure** that the door to the wind turbine and its electrical equipment room is sufficiently secure to prevent break-in without destroying the door structures.
- ✓ **Protect** locks in non-rebated doors with cover plates.
- ✓ **Ensure** that when the door is locked, the gap between the lock side and door frame is no more than 5 mm.
- ✓ **Ensure** that the gap between the lock side and door frame is no more than 5 mm when the door is locked.
- ✓ **Ensure** that the door frame is supported to the wall structure at the lock and hinge.
- ✓ **Ensure** that the door is equipped with a hinge bolt if the door's hinges can be dismantled from the outside.
- ✓ **Protect** double doors against break-in in the same manner as single-leaf doors. In addition, prevent opening of the inactive door leaf with a locked panic bolt on the inside of the door.

Windows and openings

- ✓ **Protect** windows and other openings that are less than four metres from the ground with a fixed or lockable steel grille or steel mesh.
- ✓ Alternatively, **protect** window panes with shock-resistant glass.

Locking

- ✓ **Lock** access doors with door locks that conform to at least the requirements of safety regulations for break-in protection 1.
- ✓ **Ensure** that the front door is double-locked when no personnel are working in the wind turbine or elec-

trical equipment room or the turbine is unmanned.

- ✓ **Ensure** that keys to the wind turbine and its electrical equipment room are held only by persons designated by the wind turbine's owner or operator.
- ✓ **Keep** a list of all persons with access to keys.

By following these regulations, you will ensure occupational safety and avoid unpleasant surprises in the event of an insurance claim.

Thank you for taking the time to read these safety regulations!

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