INSTRUCTION

LOCK-OUT AND TAG-OUT OF ENERGY SOURCES (LOTO) IN WINDPOWER O&M

CONTROL

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RECORD OF CHANGES

REV.	DATE	DESCRIPTION
05	04/08/2022	Update the information.

CONTENTS

1. PURPOSE

To define the criteria for locking out and tagging out (LOTO) as applicable to Wind Power Operation and Maintenance.

2. SCOPE

Wind Power Production.

Annex A65_I02_GAE07036 describes the scope matrix of the LOTO sheets according to the applicable country. And the annex A61_I02_GAE07036 proposes the minimum equipment needed per technician to be able to comply with the LOTO criteria depending on the turbine model.

TECHNOLOGIES INVOLVED	☐ ALL	PROCESSES INVOLVED		☐ ALL
☒ WIND POWER	☐ HYDRAULIC	☐ MANAGEMENT	☐ QSE+S	☐ INSTALLATION HANDOVER
☐ PHOTOVOLTAIC	☐ BIOMASS	☐ FINANCIAL	☐ GENERAL SERVICES	☒ PRODUCTION
☐ SOLAR FIELD	☐ THERMOSOLAR	☐ COMMUNICATION	☐ R&D	☒ O&M ENGINEERING
☐ ENERGY STORAGE		☐ HUMAN RESOURCES	☐ DEVELOPMENT	☐ CECOER
☐ HYDROGEN		☐ LEGAL	☐ PROJECT MANAGEMENT	☐ ENERGY MANAGEMENT
☐ OFFICE		☐ IT	☐ ENGINEERING	☐ DISTRIBUTED GENERATION
		☐ SUPPLY CHAIN	☐ CONSTRUCTION	☐ ENERGY SERVICES

3. DEFINITIONS

Actions

- Shutdown: to disable one or more functions so that the rated turbine operational conditions change state.
- Blocking: to interpose any system in the manoeuvre or operation that prevents a return to the normal production condition.
- Lock-out and tag-out: to install a padlock and tag on the blocking system. Depending on the type of blocking, it is necessary to install an intermediate system to fit the padlock.
- Identify: to install an identifying tag together with the padlock giving the worker's name, company and telephone number
- Try out: check that the LOTO system works by gently forcing the lock.

Material:

- LOTO padlock: steel or resin padlock that can be opened only with a single key held by a single worker.
- LOTO box: a box in which the keys of the padlocks used in the various locking devices must be inserted. The lid of this box allows several padlocks to be fitted simultaneously and cannot be opened until all the padlocks have been completely removed.
- LOTO tag: bearing the message “DO NOT REMOVE”, used as an additional protection for the persons working on equipment, warning of the risk and exceptional situation of this equipment. The tag does not provide protection by itself so it must always be connected to the relevant LOTO padlock.

  Only in the justified case that an effective blocking cannot be fitted in the operation is the installation of the tag only allowed.

  Smart Padlock: the use of this equipment next to the application are allowed. However, they must pass the prior validation of the QSE department.

4. LOTO CRITERIA

Guidelines for the application of the LOTO sheets

1. As a rule, each technician exposed to the power source installs his/her padlock and personal tag. This obligation of applying the LOTO criterion applies to all concurrent companies in the installation that are affected by the risks.
2. On jobs where the workers are exposed to the source of risk but do not have access to the locking system, a single padlock placed by the Team Leader may be used provided that the Team Leader has held a pre-job briefing with the rest of the members of the work team indicating which elements have been locked out. This pre-job briefing must be recorded.
3. Safe Machine Handover. Use a LOTO box and the Safe Machine Handover template:
   - when one work team carries out the lock-out and tag-out of a power source and another work team carries out certain work in that area.
   - when one work team carries out the lock-out and tag-out of a power source and another worker from another company is also working in the area.
4. The use of master keys is not contemplated.
5. Only locking devices without accessible metal parts may be used for locking electrical power sources inside electrical cabinets (provided that this alternative is available on the market). Elements made of non-conductive materials or with coated metal parts may be used.
6. Once the cut-off element has been set, confirm specifically that the setting/blocking is effective. If this check reveals a fault in the cut-off element, stop the work immediately.
7. LOTO tags associated with personal padlocks must be made of durable material. The information they must contain, clearly legible, is at least: Worker's name, Company's name and Worker's telephone number.
8. Workers must be trained with LOTO procedures and have the proposed blocking material at their disposal. Other types of material that fulfil the same function are also admissible.
9. In the event of having to carry out an exceptional removal of the LOTO system, request authorization from the Site Manager
10. LOTO devices must be removed at the end of the work.

4.1. POWER SOURCES TO BE BLOCKED

At least the following:

- Communications: remote and local signals to prevent unexpected wind turbine start-up.
- Drive shaft: screw, bolt, pin, hydraulic system, or other element of the rotor lock to prevent it from turning without the consent of the affected personnel.
- Generator: both rotor and stator circuits to be able to work on the electrical component.
- Electric motors: motor protectors and circuit breakers to be able to work on motors, geared motors, lights, etc.
- Lift: control of the equipment to avoid movement while personnel are exposed in the path of the lift (checking the life line, carrying out a repair in the tower, etc).
- Helper: system to assist the personnel ascend.
- Transformer sub-stations, isolation centres, Pad Mounted, etc.
- Ground switchgear for access to foundations, etc.
- Any other item or equipment whose activation or release of power could endanger persons working on it.
- Lifeline in turbine and meteorological mast. Although it not a source of power as such, this is one element, due to their importance, must be blocked if it is not in good conditions.

4.2. EXCEPTIONAL REMOVAL OF THE LOTO SYSTEM

If the worker who installed the LOTO padlock is not available to remove it at the end of the works, notified this one to the Site Manager. She/he checks that all the works have finished and all the workers are out of the work area.

Once the Site Manager has approved the removal, proceed to remove the padlock.

5. LOTO APPLIED TO WIND TURBINES

Taking into account the main energy sources that can compromise the safety of technicians in wind turbine operation and maintenance work (electrical, mechanical and wind turbine communication), has been created the LOTO sheets indicated in the chapter 'Related Documentation"' have been prepared as an annex.

This is a non-exhaustive list of data sheets summarising in detail the actions to be carried out regarding the various energy sources for each turbine model, although there may be additional scenarios in which, if identified in the relevant risk assessment, the LOTO system for blocking and interlocking must also be applied.

Given that not all disconnection or blocking elements of the energy source are ready to be blocked by origin or by design, some wind turbine models have had to be adapted beforehand to be able to apply the LOTO criteria.

6. LOTO APPLIED IN SUB-STATION AND HIGH VOLTAGE LINE

The creation of the Protected Zone by CECOER is undertaken by opening and blocking the isolation points. The keys of the LOTO padlocks that block these operations are placed in a LOTO box. This box is locked at least by the Outage Agent and the Work Chief.

In this type of Outage the information carried by the tags is generated via DAT app.

When creating the Work Area within the Protected Area, if there are elements that isolate the circuitry in this area, they must also be opened and blocked with LOTO padlock. In this case it is not mandatory to generate a LOTO box or to be blocked by all workers, always when the Prejob Breafing is done.

7. LOTO PROCEDURES TRAINING

All workers must receive general training in the LOTO procedure to be able to recognise the safety function of padlocks and tags as well as the application of LOTO depending on their activity.

The technician's training, external or ACCIONA's workers, in LOTO requirements must be included in the business activity coordination process.

The LOTO sheets and these instructions are given by ACCIONA Energía to each contractor before entering to the facility. The responsibility of the contractors is to train their workers in these LOTO sheets and how to apply them.

ACCIONA Energía may require proof of this training if it detects deviations in the application of the LOTO procedure, or even request such records in advance to give the access.

Periodic refresher training is also required every 36 months at the latest or when inspections reveal inadequate knowledge of the programme by employees.

THE CRITERIAL ABOUT TRAINING AND REFRESH STARTS JANUARY 1ST 2023.

8. RELATED DOCUMENTATION

The following lists the LOTO sheets grouped by technology.

8.1. LIFT

CODE	TITLE
A01_I02_GAE07036	Avanti lift
A04_I02_GAE07036	Goian lift
A05_I02_GAE07036	Onik lift
A06_I02_GAE07036	Tractel lift
AES01_I02_GAE07036	Ecoelevadores
AES02_I02_GAE07036	Equipamientos Eólicos lift
A79_I02_GAE07036	Hailo lift

8.2. HELPER

CODE	TITLE
AES58_I02_GAE07036	Ayudador 3S Lift
AES59_I02_GAE07036	Ayudador Windtools
AES60_I02_GAE07036	Ayudador Gapi
AES61_I02_GAE07036	Ayudador Sela
AES63_I02_GAE07036	Ayudador Goian
AES64_I02_GAE07036	Ayudador Power Climber
A74_I02_GAE07036	Tractel Helper

8.3. AW1500, AW3000, IT1300

CODE	TITLE
A07_I02_GAE07036	AW1500. Communications
A08_I02_GAE07036	AW1500. Drive Shaft
A09_I02_GAE07036	AW1500. Generator
A67_I02_GAE07036	AW1500. Yaw motors
A10_I02_GAE07036	AW3000. Communications
A11_I02_GAE07036	AW3000. Drive shaft
A12_I02_GAE07036	AW3000. Generator
A68_I02_GAE07036	AW3000. Yaw motors
AES13_I02_GAE07036	IT1300. Comunicaciones

CODE	TITLE
AES14_I02_GAE07036	IT1300. Tren de potencia
AES15_I02_GAE07036	IT1300. Generador
AES44_I02_GAE07036	IT1300. Motores de yaw

8.4. BONUS 600, BONUS 1300

CODE	TITLE
AES03_I02_GAE07036	BONUS 600. Comunicaciones
AES04_I02_GAE07036	BONUS 600. Tren de potencia
AES05_I02_GAE07036	BONUS 600. Generador
AES48_I02_GAE07036	BONUS 600. Motores de yaw
AES06_I02_GAE07036	BONUS 1300. Comunicaciones
AES07_I02_GAE07036	BONUS 1300. Tren de potencia
AES08_I02_GAE07036	BONUS 1300. Generador
AES49_I02_GAE07036	BONUS 1300. Motores de yaw

8.5. G4X, G5X, G8X

CODE	TITLE
AES09_I02_GAE07036	G4X. Comunicaciones
AES10_I02_GAE07036	G4X. Tren de potencia
AES11_I02_GAE07036	G4X. Generador
AES12_I02_GAE07036	G4X. Motores
A26_I02_GAE07036	G5X. Communications
A27_I02_GAE07036	G5X. Drive shaft
A28_I02_GAE07036	G5X. Generator
A69_I02_GAE07036	G5X. Yaw motors
A29_I02_GAE07036	G8X. Communications
A30_I02_GAE07036	G8X. Drive shaft
A31_I02_GAE07036	G8X. Generator
A70_I02_GAE07036	G8X. Yaw motors

8.6. GE1500

CODE	TITLE
A19_I02_GAE07036	GE1500. Communications

CODE	TITLE
A20_I02_GAE07036	GE1500. Drive shaft
A21_I02_GAE07036	GE1500. Generator
A72_I02_GAE07036	GE1500. Yaw motors

8.7. LAWERGEY

CODE	TITLE
AES16_I02_GAE07036	LAWERGEY. Comunicaciones
AES17_I02_GAE07036	LAWERGEY. Tren de potencia
AES18_I02_GAE07036	LAWERGEY. Generador
AES51_I02_GAE07036	LAWERGEY. Motores de yaw

8.8. NORDEX N100, NORDEX DELTA 4000

CODE	TITLE
AES53_I02_GAE07036	Nordex N100. Comunicaciones
AES55_I02_GAE07036	Nordex N100. Tren de potencia
AES56_I02_GAE07036	Nordex N100. Generador
AES57_I02_GAE07036	Nordex N100. Motores de yaw
A76_I02_GAE07036	Nordex Delta 4000. Communications
A78_I02_GAE07036	Nordex Delta 4000. Drive shaft
A75_I02_GAE07036	Nordex Delta 4000. Generator
A77_I02_GAE07036	Nordex Delta 4000. Yaw motors

8.9. MADE AE32, AE46, AE5x(S800) and AE61

CODE	TITLE
AES19_I02_GAE07036	MADE AE32. Comunicaciones
AES20_I02_GAE07036	MADE AE32. Tren de potencia
AES21_I02_GAE07036	MADE AE32. Generador
AES22_I02_GAE07036	MADE AE32. Motores
AES45_I02_GAE07036	MADE AE32. Motores de yaw
AES42_I02_GAE07036	MADE AE32. Centro de Transformación
AES23_I02_GAE07036	MADE AE46. Comunicaciones
AES24_I02_GAE07036	MADE AE46. Tren de potencia
AES25_I02_GAE07036	MADE AE46. Generador

CODE	TITLE
AES26_I02_GAE07036	MADE AE46. Motores
AES46_I02_GAE07036	MADE AE46. Motores de yaw
AES27_I02_GAE07036	MADE AE59. Comunicaciones
AES28_I02_GAE07036	MADE AE59. Tren de potencia
AES29_I02_GAE07036	MADE AE59. Generador
AES30_I02_GAE07036	MADE AE59. Motores
AES47_I02_GAE07036	MADE AE59. Motores de yaw
AES31_I02_GAE07036	MADE AE61. Comunicaciones
AES32_I02_GAE07036	MADE AE61. Tren de potencia
AES33_I02_GAE07036	MADE AE61. Generador
AES34_I02_GAE07036	MADE AE61. Motores
AES43_I02_GAE07036	MADE AE61. Motores de yaw

8.10. NEG MICON

CODE	TITLE
AES35_I02_GAE07036	NM750. Comunicaciones
AES36_I02_GAE07036	NM750. Tren de potencia
AES37_I02_GAE07036	NM750. Generador
AES38_I02_GAE07036	NM750. Motores
AES50_I02_GAE07036	NM750. Motores de yaw

8.11. VESTAS

CODE	TITLE
AES39_I02_GAE07036	VESTAS V39/42/V44. Comunicaciones
AES40_I02_GAE07036	VESTAS V39/42/V44. Tren de potencia
AES41_I02_GAE07036	VESTAS V39/42/V44. Generador
AES52_I02_GAE07036	VESTAS V39/42/V44. Motores

8.12. LIFE LINE, FOUNDATION INSIDE WIND TURBINE AND PAD MOUNTED

CODE	TITLE
A63_I02_GAE07036	Foundation inside wind turbine
A66_I02_GAE07036	Life line
A71_I02_GAE07036	Pad mounted

8.13. COMPLEMENTARY SHEETS

CODE	TITLE
A61_I02_GAE07036	O&M technical kit
A65_I02_GAE07036	LOTO sheets scope matrix
FES01_I02_GAE07036	Secuencia enclavamiento LOTO. Intervención aerofreno Bonus 600
FES02_I02_GAE07036	Secuencia enclavamiento LOTO. Instalación tornillo antigiro Bonus 600
FES03_I02_GAE07036	Secuencia enclavamiento LOTO. Intervención aerofreno Made 32
FES04_I02_GAE07036	Secuencia enclavamiento LOTO. Intervención aerofreno Made 46 sin giro de rotor
FES05_I02_GAE07036	Secuencia enclavamiento LOTO. Intervención aerofreno Made 46 con giro de rotor
FES06_I02_GAE07036	Secuencia enclavamiento LOTO. Intervención aerofreno Neg Micon 750

***Note**. Complete this table with the documentation, legislation, regulations, etc, related to the document.*