



# ELECTRIC ARC IN AW1.5 CONTACTOR MODULE



## QSE alert

Associated non-conformity code: NC2016004246

This document contains public information and it is intended to share the lessons learnt from incidents and risk situations that could be of interest to others in the same sector as Acciona Energía.

This document may undergo updates due to the collection and analysis of better information, because of technical advances and the proposed measures etc. For this reason, it is very important to check with Acciona Energía for the latest versions of the issued alerts.

## SCOPE

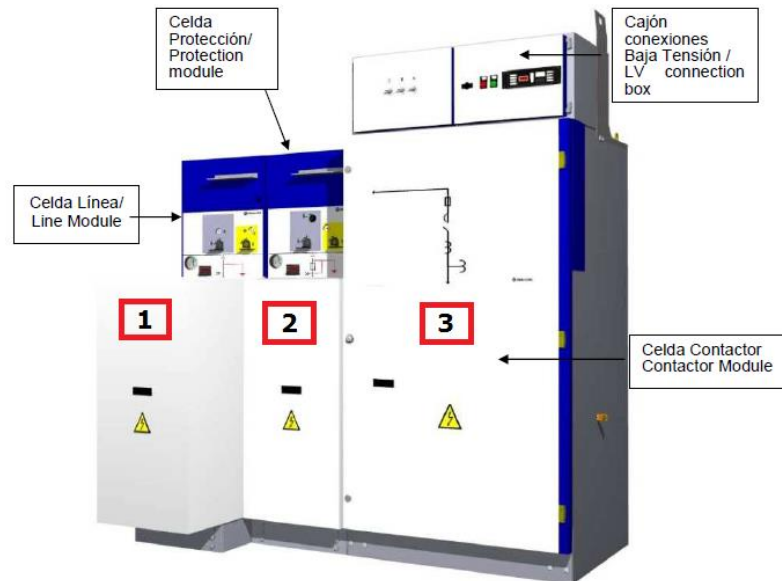
- World-wide
- All businesses
- All technologies
- Others. Specify:
- Local. Country:
- Construction
- Wind power
- Photovoltaic
- Production
- Hydraulic
- High voltage
- Thermoelectric

## FACTS

### General context of accident

The events occurred in an Acciona Energía wind farm on 3 August 2016.

A pair of technicians attended a machine to start the scheduled preventive maintenance. As a prior step before starting the work, before ascending to the nacelle, they had to earth the contactor module (module 3) using portable earthing equipment (a normal operation in this type of work).



Front view of Cosmos modules (12 kV)

One of the technicians, using the necessary individual electrical protection equipment (helmet with face screen, insulated gloves, insulated mat, full coverage clothing suitable for electrical work, etc), started the operating sequence on these modules.



# ELECTRIC ARC IN AW1.5 CONTACTOR MODULE



## QSE alert

Associated non-conformity code: NC2016004246

### Description of the accident

The technician started operating on module 2 (protection module) by pressing the rotating switch on it. He then closed the earthing isolator on that module after which he removed the C key from the module.

He then moved to module 1 (line module), opened the switch and removed the B key without noticing that the indicator remained closed (the "usual noise" of opening the switch and above all the "normal freeing" of the B key did not give him cause to think that something had not gone well).

The technician used the B and C keys to remove the A key from the contactor module. With the door of the module open and using the individual electrical protection equipment mentioned above, the technician checked for the absence of power upstream of the contactor. On the three phases, R, S and T, the tester confirmed the absence of power, using the tester on the equipment itself before and after each check to confirm that it functioned correctly. At this time the technician placed the first portable earth connections in accordance with the procedure, first connecting the earth clamp to the module bus bar and then earthing each phase on the bus bar connecting TIs and TTs.

He then carried at the same process upstream of the contactor, checking for the absence of power in each phase. He placed the earth phase to the module bus bar and, using the rod, placed the phase clamps for the earthing set. At this exact moment, on placing the first phase clamp, a strong electric arc occurred between the phase (upstream of the contactor) and earth.

The CECOER department contacted the technicians on the farm who confirmed the tripping of the module and that they were okay. The CECOER department told them not to carry out any further action or operation.

### Consequences of the electric arc

As a consequence of the electric arc, there was a flash without consequences to either of the technicians present in the operation.

The short circuit, which tripped connection 4, damaged the stator contactor (Figures 1 and 2) and the portable earthing set (Figure 3).



# ELECTRIC ARC IN AW1.5 CONTACTOR MODULE



Figure 1



Figure 2

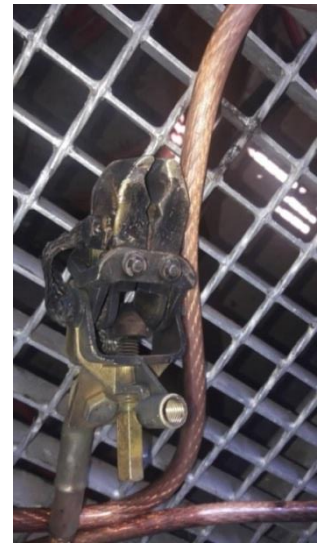


Figure 3

## LESSONS LEARNED

- The proper and a rigorous use of the individual protection equipment saves lives and prevents serious injuries. This is a clear example of this.
- In no case and even less when working on a module, can one work solely and exclusively by ear. The displays are there for checking before and after the operations; any irregularity in them must cause the immediate suspension of the operations.
- Pending the analysis of the module to determine the causes of its technical failure and to define the corrective actions to be implemented, all procedures for working on cells must be revised so that always after the trip it is possible to check for the absence of power using the multimeter on the LEDs. Although this does not avoid the later check with a tester for the absence of power at the working point, it serves as a redundant method for checking for the absence of power (and, therefore, for reducing the risk).
- It must be remembered that the LEDs themselves are not a reliable method for checking for the absence of power – it is obligatory to use the multimeter.
- Even if not the case, for the check for the absence of power to be effective, it is basic that the check been made at the suitable measurement points.
- Maintenance companies must ensure that they work with the updated instructions in the latest revision, ensuring that they are used by the technicians on the farm.

Note: at the time of publication of this warning, the results of the laboratory analysis of the absence of power tester had not been received.