Technical Note – Use of SolarEdge Components in Agricultural Environments

Introduction

Agricultural buildings such as barns or animal sheds are typically good sites for PV installation, due to roof size and the roofs having few obstacles. However in such buildings corrosion of the PV components due to ammonia fumes has to be considered. The sources for ammonia in agricultural areas are fertilizers as well as animal droppings. In the presence of water or humidity ammonia creates aggressive fumes that can damage components, either by making enclosures fragile or by harming the product sealing, both of which can lead to water ingress.

To ensure proper operation of the PV system the system components should be resistant to corrosion by ammonia fumes.

The SolarEdge inverters and power optimizers were tested in harsh ammonia exposure conditions and were shown to be resistant to ammonia corrosion. This is important not only for the inverters which are usually installed inside the facilities, but also for the power optimizers which are installed on the roof where ammonia concentration is lower. For the test results click here.

Test Procedure and Results

Scope of the Test

The following products were tested:

- SE25K inverter, with and without a DC Safety Unit
- Power optimizer

All SolarEdge inverters use the same enclosure materials and methods, therefore the test results are applicable to all inverter models. The same is true for the power optimizers.

Storing in Ammonia Atmosphere

There is no IEC standard regarding ammonia resistance, therefore the test was performed according to the specification “2 Pfg 1911/03.2001 clause 6.3.1” from TÜV Rheinland. TÜV Rheinland has long standing experience in testing of PV components and is conducting research regarding the lifetime of PV systems. SolarEdge has chosen this specification because it is considered the harshest and most realistic one.

The SolarEdge products were stored in a harsh ammonia atmosphere for 480 hours (20 cycles of 24h each; this is the harshest test procedure – the manufacturer can select 1-20 cycles). The products were then tested for typical failure mechanisms, namely loss of mechanical resistance of the enclosure and reduced protection against water ingress due to damaged sealing.

Mechanical Resistance Test

After the 480h exposure to ammonia, the products were tested for mechanical resistance according to the following standards:

- Inverter: IEC/EN 62109-1, clauses 13.7.2 & 13.7.3 - tests for metal enclosures and polymeric enclosures
- Power optimizer: IEC/EN 62109-1, clause 13.7.2 - test for metal enclosures

The test results show that the mechanical resistance of both the inverters and the power optimizers is maintained after the long exposure to an ammonia atmosphere.

Ingress Protection Test

The products were also tested for ingress protection according to the following standards:

- Inverter: IEC/EN 62109-1, IP test (protection against ingress of foreign objects)
- Power optimizer: EN 50548 (module junction box), wet leakage testing (the power optimizer is potted and therefore the IP test could not be performed directly)

The inverters maintained their IP rating with no ingress of water or dust. The power optimizer passed this test and maintained its insulation resistance above the required limit.