omega inspectie

Reserach report

The conductivity of Rable solar panel substructure

Client	Rable
Documentnumber	12996 (inspectierapport Scope 12 Rable onderconstructie)

Dhr. C. van Emmerik
Manager inspections
Signature:

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Hagenweg 1C • 4143LX • Vianen • www.omega-energietechniek.nl • 088-2056101 May 2023

Inhoud

Research

Rationale

Rable manufactures a substructure for solar panels on flat roofs. Since the publication of NEN1010:2015, installers are increasingly performing checkups to the substructure for PV systems. Rable wants to know if the product provides sufficient conductivity so it can inform installers about the process of applying the Rable substructure checks.
Rable has commissioned Omega Energietechniek to investigate the system's internal conductivity.

Approach

Starting point

This study assumed that there is no standard that specifies requirements for the internal resistance of a substructure.
Given that the request from Rable arose due to a change in NEN 1010, this study will adhere as closely as possible to the requirements of NEN 1010:2015 + C1:2015. At the time of the study, this was the version of NEN 1010 designated by the Building Decree and the Government Gazette.
The substructure will be considered part of the equipotential bonding. In accordance with the requirements of Chapter 61 of NEN 1010:2015, resistance will be determined through measurements. This is the method by which the continuity of protective conductors in an installation must be determined. During this investigation, the installation tester Nieaf Smitt Installtest XE with serial number 19280841 was used for the measurements, all carried out on April 20, 2023. This tester was last calibrated on January 12, 2023.

Sub-studies

This study consists of two sub-studies. These consist of measurements on two different setups, namely:

- An indoor test setup with new materials
- An existing outdoor system (>1 year old)

In the test setup, the resistances of all individual connections are measured separately. This is to determine if any connections are non-conductive. Then, random resistance measurements are taken in two separate operational systems, as is customary for inspections in accordance with standards such as:

- NEN1010:2015 + C1:2016,
- NEN-EN-IEC 62446:2016, and
- NEN 3140:2019.

Research results

Test setup

Description

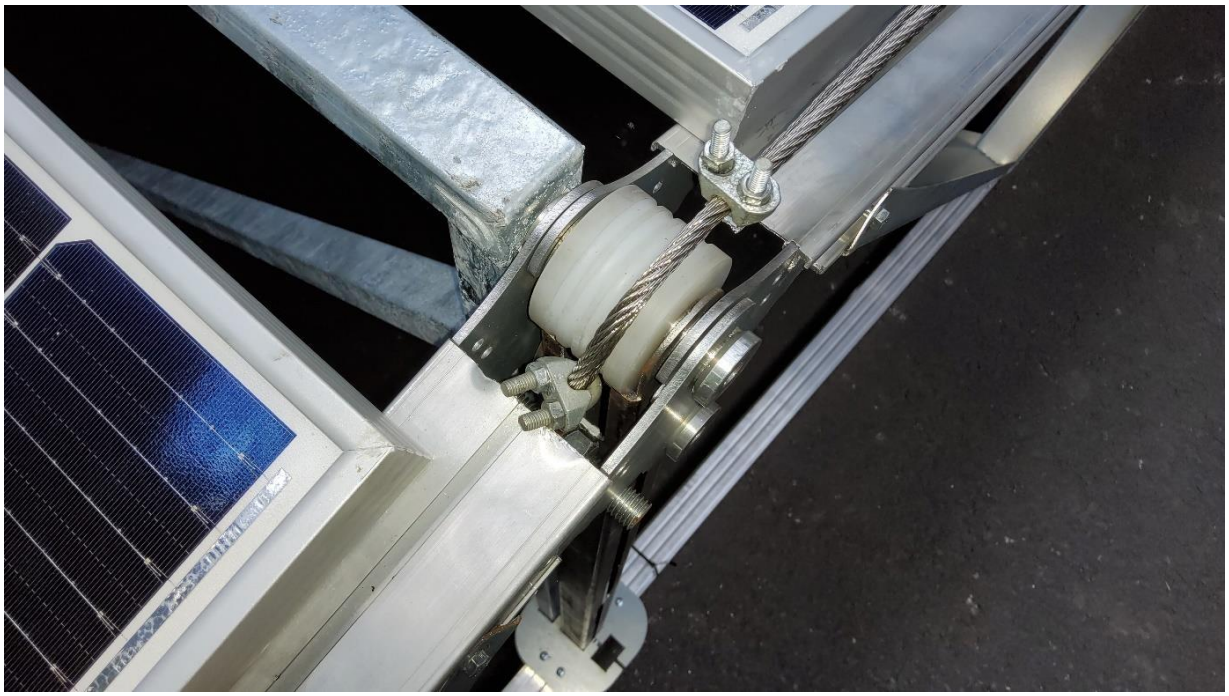
The test setup consists of several interconnected sections, with two or more substructure sections connected together according to the manual. The entire structure is tightened with steel cables, which provide the load-bearing capacity and stiffness. This allows all connections to be measured separately.

img. 1 indoor test setup

Measurement results

The resistance of the connections to the substructure is 0.07Ω. This is sufficiently low.
The resistance of the connection between the carrier and the steel cable is 0.27Ω. This is also sufficiently low.

Note: A low-resistance connection between PV modules and the substructure cannot be guaranteed long-term due to external influences and therefore does not provide a representative picture.



img. 2 test setup steel cable connection.

The resistance of all other connections is a maximum of 0.17Ω, again the lower limit of the installation tester's measuring range.
The resistance of these connections is sufficiently low.

System (indoor and outdoor setup)

Description

In this system, the panels are oriented like the internal system in an east-west configuration. The system has a roof shape. Each roof segment has two eight-panel configurations and can be expanded and connected as needed.
The system is approximately one year old, installed according to the installation instructions, and is visually free of defects.

img. 3 setup of steel cable

img. 4 setup of guidance bearings

img. 5 setup of underside

Measurement results

The resistance between two points on the substructure was measured randomly.
The sample also included measurements between the connections at the corners of the field.
A total of fourteen resistance measurements were taken.
The lowest measured value was 0.01Ω, the lower limit of the measuring range of the installation tester used. The highest measured value was 0.03Ω.
The resistance at the substructure and the bonding line is sufficiently low.

Conclusion

When installed correctly in accordance with the installation instructions, the Rable substructure has sufficient conductivity to be included in the PV system.

As far as can be determined, time and weather conditions appear to have little or no effect on the internal resistance of the Rable substructure.