Equipotential bonding

blubase™

OVERVIEW OF EQUIPOTENTIAL BONDING

According to NEN 1010/NEN-EN 62446, installers are required to carry out an (electro)technical inspection upon delivery of the PV installation. Solar power installations come under the NEN 1010 installation standard. This standard includes both the alternating current (AC) part from the inverter to the meter cupboard and the direct current (DC) part from the solar panels to the inverter.
The quality and capacity of the cabling are an important aspect to consider.

Even though solar panels are double insulated (class II), they can, for example, be subject to a certain amount of electrostatic voltage as a result of connecting two electrical oscillating circuits (DC/AC). This is not dangerous in itself but can trigger a startle reaction (on the roof).
For this reason, NEN 1010 and NPR 5310 also advocate providing the conductive supporting structure of panels, including the metal cable support systems, with equipotential bonding. This means that they must be connected in order to allow this voltage build-up to flow away without creating measurable currents. The frames of the solar panels must also make conductive contact with the mounting system.

NB: providing the installation with equipotential bonding is not the same as earthing it. Equipotential bonding involves equalising reciprocal voltage, while earthing is intended to dissipate current to earth. The equipotential bonding circuit must be connected to a suitable earthing connection point (as close as possible to the point of entry into the building) that is directly connected to the equipotential bonding rail (in the meter cupboard). Therefore, not via the inverter! Connection points for a lightning protection system are not necessarily considered suitable for this, see below.

EQUIPOTENTIAL BONDING AT BLUBASE

Blubase flat roof mounting systems are naturally suitable for equipotential bonding because they are made up of conductive metal components. As an additional safety check, the systems were externally tested at the end of 2019 by Straight Forward in Urmond, the Netherlands. This company specialises in all technical aspects of solar power and carries out independent checks on PV systems.
Based on the measurements taken from both the test setup and existing systems on buildings, Straight Forward determined that Blubase's flat roof mounting systems have permanent conduction with a low resistance (± 0.2 Ω).

The south-facing setup of the Blubase flat roof mounting systems is fitted with rear panels. These aluminium rear panels provide additional conduction from the rows to the left to right, thereby achieving a low resistance.

No rear panels are used for the East-West setup. If the measurement shows that the measured resistance deviates from the standard, Blubase recommends using the additional earthing cables mentioned above
(two per continuous module field) to connect the rows to each other for additional conduction.

NB: these equipotential bonding conductors (insulated or non-insulated) must have a minimum diameter of 4 mm2 in copper or an equivalent material.

At the time of writing this document (February 2020), there is no clear indication of the maximum permissible resistance value. In the new IEC 60364 standard (the European overarching standard on which NEN 1010 is based and which applies to PV systems), the definition and the background of equipotential bonding will change slightly: equipotential bonding is also intended to guarantee that the inverter's insulation is monitored properly.

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Blubase believes that a measured resistance value with equipotential bonding of less than 10 Ω for its flat roof mounting system is satisfactory in practice. After installation, the electrical resistance must be measured between the earth point and some randomly selected points on the flat roof mounting system. The measurement results must comply with this standard and be included in the technical delivery document.

EQUIPOTENTIAL BONDING AND LIGHTNING PROTECTION

As a result of climate change, buildings are increasingly being fitted with a lightning protection system. Standard NEN-EN-IEC 62305 applies to the design, installation and maintenance of new and existing lightning protection systems. If a building is fitted with such an installation and parts of the PV installation are within the safety distance (to be calculated according to standard NEN-EN-IEC 62305), NEN-EN-IEC 62305 stipulates to what extent and in what way the PV installation must be connected to the lightning protection system for equipotential bonding.

If the PV installation is externally protected against lightning, the internal electrotechnical installation must also be protected against overvoltage. After all, they are directly connected to each other. If this action is not taken, lightning could result in considerable damage to the installation, the connected machines and equipment and/or even the outbreak of fire. Even with a well-deflected strike within the apartment
or building, damage can still be caused.

To determine whether lightning protection is required, NEN 1010 refers to the risk analysis in NEN-EN-IEC 62305.

EQUIPOTENTIAL BONDING CONDUCTORS

Equipotential bonding conductors (insulated or non-insulated) must have a minimum diameter of 4 mm2 in copper or an equivalent material. They must be indicated by the green-yellow colour combination and this colour combination must not be used for any other purpose.
Insulated protective conductors for earthing and equipotential bonding must be indicated as protective conductors.

NB: in the case of equipotential bonding of the lightning protection system on the PV installation, the equipotential bonding conductor must have a diameter of 16 mm2.

LIMITED LIABILITY

This document has been compiled based on information available from Blubase and on the test findings from Straight Forward. The expected level of care has been taken in compiling it.

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