

AVRV A.E.

Grid Connected PV Stations Inspection and Certification



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Inspection and Certification of PV Stations



AVRV A.E provides inspection and certification services of photovoltaic installations against the requirements of national and international standards

IEC 62446:2009 and the associated IEC 60364-6:2007, IEC60364-7-712:2005

The services are provided in line with a comprehensive inspection protocol developed especially for the purposes of certification.



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...is there really a need for PV certification

Problems

- Relatively new, low maturity technology
- Not adequate historical data
- Investors, financial institutions and insurance companies not well informed
- Large number of involved parties (manufacturers, installers, design engineers, insurance, financial institutions)
- High competition and pressure on pricing
- Non adequately regulated business sector

Consequences

- Low profit margins for Installers, Designers, Manufacturers
- Failures in design or installation of a PV Station results in financial loss
- Considerable risk for financial institutions or investors



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... does PV Certification help to reduce risk

The most reliable strategy for risk elimination while investing in a PV station is to seek for

CERTIFICATION

AGAINST

INTERNATIONALLY RECOGNISED STANDARDS



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... PV Certification... some terms

STANDARDIZATION

Development and publishing of guidelines, rules and specifications (i.e. STANDARDS) for public use, in order to achieve an optimum degree of order and uniformity at a commonly accepted level.

Materialized by Standardization Bodies (eg. ISO, IEC, ITU)

CERTIFICATION

Official verification from an independent party (third party) that requirements of the referenced standards are met in a way that it can be demonstrated through the implementation of a specified inspection protocol.

Materialized by Certification Bodies (eg. AVRv)



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benefits of Accredited Certification

- ✓ Inspection procedure implemented by highly qualified personnel,
- ✓ Use of only calibrated measuring devices
- ✓ Traceability of inspection data at every stage of the certification procedure
- ✓ Independence from all involved parties in the construction of the installation
- ✓ Transparency and impartiality in the operation of Certification Bodies
- ✓ Assurance that relevant standards are implemented in the same manner throughout the Global marketplace
- ✓ Increase of confidence of stakeholders (investors, financial institutions, EPC's)
- ✓ Ease to withdraw for the investment in the future, (if it is decided to do so)



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PV Stations : Standards and Certification

International Electrotechnical Commission – IEC responsible for the standardization of electrical equipment and installations.

In 2009 standard **IEC 62446:2009** was issued covering the following scope:

Grid connected PV systems – Minimum requirements for the documentation of the system, commissioning tests and inspection



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PV Stations : Standards and Certification

The **IEC 62446:2009** standard aims to:

1. Define the minimum information and documentation which **MUST** be submitted to the owner of a grid connected PV station.
2. Describe the minimum commissioning tests and the inspection criteria as well as the expected documentation of them, in order to ensure safe and effective installation and operation of the PV station.

It can be applied also for the periodic inspection of a completed and operating PV Station.



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Certification of a PV Station by AVR V

AVRV A.E is an inspection and certification body in Greece and in Europe for the Inspection and Certification of PV Stations against the requirements of IEC62446:2009.

AVRV A.E has developed an inspection methodology which is in accordance with EN ISO/IEC17020:2004 – General criteria for the operation of inspection bodies.



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Certification of a PV Station by AVR V

The Management System implemented at AVR V includes all necessary provisions and is designed in order to allow for the verification of implementation of:

- ✓ **the core standard IEC 62446:2009**
- ✓ **other supporting standards**

EAOT HD 60364 – 6 : 2007 Low voltage Electrical installations - Part 6: Verification

EAOT HD 60364 – 7 - 712 : 2005 Electrical installations of buildings - Part 7-712: Requirements for special installations or locations - Solar photovoltaic (PV) power supply systems

- ✓ **Special Inspection Protocol** developed by AVR V A.E



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The AVR V PV Station Inspection Protocol

AVRV Inspection Protocol for the certification of a PV Station includes the following phases :

PHASE 1 : Assessment of the Design Study (static analysis / engineering study / electrical study / performance estimate analysis)

PHASE 2 : Inspection of the construction of supporting infrastructure (foundations, anchors)

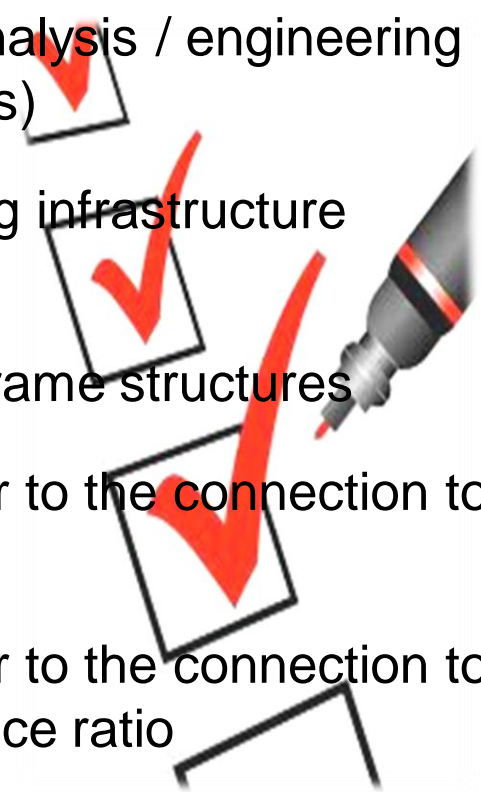
PHASE 3 : Inspection of the construction of metallic frame structures

PHASE 4 : Inspection of the electrical installation prior to the connection to the grid (*open circuit*)

PHASE 5 : Inspection of the electrical installation prior to the connection to the grid (*closed circuit*) – certification of the performance ratio



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... One step ahead from the rest

AVRV A.E can demonstrate vast experience in the field of quality control of construction projects (acting as inspection body in projects during the erection of commercial an industrial building of more than 250000 m² for clients such as Carrefour, Metro, Orphee Beinoglou)

Capitalizing on this experience we decided to include in our Accredited Inspection Protocol the following aspects of the construction of a PV Station (not directly required by the referenced standards):

PHASE 2 : Inspection of the construction of supporting infrastructure (foundations, anchors)

PHASE 3 : Inspection of the construction of steel structures

PHASE 5 : Inspection of the electrical installation prior to the connection to the grid (*closed circuit*) – certification of the performance ratio



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... AVRV Inspection Protocol Phases 2 & 3

According to our protocol, the supporting infrastructure and the metallic construction are inspected against the requirements of EUROCODES (globally accepted comprehensive set of European Norms) as follows:

Eurocode 0 – Basis of structural design - ΕΛΟΤ EN 1990 : 2002/A1

Eurocode 1 – Actions on structures

ΕΛΟΤ EN 1991 -1-1: General actions — Densities, self-weight, imposed loads for buildings

ΕΛΟΤ EN 1991 -1 -3 : General actions - Snow loads

ΕΛΟΤ EN 1991 -1 -4 : General actions - Wind actions

Eurocode 3 – Design of Steel Structures

ΕΛΟΤ EN 1993 -3 -1 : Towers, masts and chimneys

Eurocode 7 – Geotechnical Design ΕΛΟΤ EN 1997 -1

Eurocode 8 –

ΕΛΟΤ EN 1998 - 5 Foundation / Geotechnical

ΕΛΟΤ EN 1998 - 6 Earthquake Resistance

Eurocode 9 – Aluminum ΕΛΟΤ EN 1999 -1 -1



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...AVRV PV Inspection Protocol Phase 5

The Performance Ratio

We verify the true performance of the PV Station using measuring instruments calibrated with reference traceable to national standards, thus ensuring undisputed accuracy.

Equipment utilized includes:

POWER LOGGER - ANALYST



INDUSTRIAL SCOPEMETER



TRUE RMS MULTIMETER Vdc



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PV Certification ... benefits at a glance

- ✓ Reduced risk of an accident
- ✓ Reduced probability of failure as a result of implementation of sound engineering specifications
- ✓ Reduced warranty costs for EPCs as a result of reduced probability of failures
- ✓ Improved corporate image for EPCs, designers, installers
- ✓ Improved awareness among the investor community
- ✓ Sound project scheduling (timely completion)
- ✓ Facilitation of the on going maintenance of the PV Station
- ✓ Increased life cycle of the PV Station
- ✓ Assurance of investment «Due diligence» of the investment



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**We can work together
and create a safer future**



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