



BSI Standards Publication

Photovoltaic systems – Guidelines for effective quality assurance of power conversion equipment

National foreword

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PHOTOVOLTAIC SYSTEMS – GUIDELINES FOR EFFECTIVE
QUALITY ASSURANCE OF POWER CONVERSION EQUIPMENT**

FOREWORD

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 63157, which is a technical specification, has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

The text of this technical specification is based on the following documents:

| | |
|---------------|------------------|
| Enquiry draft | Report on voting |
| 82/1595/DTS | 82/1625A/RVDTS |

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

The fundamentals of maintaining a quality assurance system are described in ISO 9001. The IEC Technical Committee 82 has supplemented ISO 9001 with additional technical details for guiding creation of quality assurance systems for the manufacture of photovoltaic (PV) modules (IEC TS 62941) and for installation of photovoltaic systems (IEC TS 63049).

Failures of PV systems are often reported to be caused by failures of the power conversion equipment, such as inverters and DC-DC converters. This document was developed to help the industry reduce those failures in a standardized and cost-effective way. It builds on ISO 9001 by adding technical details to be included in a quality assurance system. To facilitate the understanding of how ISO 9001 complements this document, the related ISO 9001 clause/subclause numbers are noted in square brackets as part of each heading as well as being tabulated in Annex A. A few references are also made to the IATF (International Automotive Task Force) 16949 *Quality Management Systems*.

PHOTOVOLTAIC SYSTEMS – GUIDELINES FOR EFFECTIVE QUALITY ASSURANCE OF POWER CONVERSION EQUIPMENT

1 Scope

This document lays out recommendations for best practices for product realization, safety, customer satisfaction, and stakeholders' relationship used in the manufacture of power conversion equipment (PCE).

This document captures key requirements customers would like to see completed to ensure high-quality products, specifically, that the products have the documented properties, including properties needed to give customer satisfaction with regard to the warranty.

The object of this document is to provide more confidence in the ongoing consistency of performance and reliability of certified power conversion equipment. The requirements of this document are defined with the assumption that the quality management system of the organization has already fulfilled the requirements of ISO 9001 or equivalent quality management system. These guidelines also form the basis for factory audit criteria of such sites by various certifying and auditory bodies.

This document covers manufacture of electronic power conversion equipment intended for use in terrestrial PV applications. The term PCE refers to equipment and components for electronic power conversion of electric power into another kind of electric power with respect to voltage, current and frequency. This document applies to PCE in both indoor and outdoor open-air climates as defined in IEC 60721-2-1 and IEC 60721-3-3. Such equipment may include, but is not limited to, DC-to-AC inverters, DC-to-DC converters and battery charge converters.

This document covers PCE that is used with PV arrays. The equipment may also be connected to other DC source or load circuits such as batteries. All parts of the PCE are included (e.g. connectors and software). This document may be used for accessories for use with PCE, except where more appropriate standards exist.

The object of this document is to define steps for providing assurance that:

- The customers' expectations are identified and the product is designed to meet those expectations,
- The performance characteristics and method of meeting the customers' expectations (e.g. efficiency) are identified,
- The specifications are either in conformance with the related standards or mentioned by the manufacturer on the data sheet or other product literature,
- The product has each of the properties described on the data sheet or other product literature, and
- The product has been designed and manufactured to retain those same properties after normal and reasonable environmental stresses experienced in the field (including worst-case typical temperatures, thermal cycling, corrosive conditions, over voltages/currents on DC and AC lines, transportation and installation, etc.) as well as survive stresses coming from the grid within the promise of the warranty.

To achieve these goals, this document requires:

- Analysis to identify potential failure modes and creation of a plan to prevent these during the time of the design lifetime,
- A documented change management control process to address raw material or manufacturing changes arising both internal and external to the organization,