

Status of IEEE P1526— Recommended Practice for Testing the Performance of Stand-Alone Photovoltaic Systems

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ABSTRACT

This paper provides an update on the status of IEEE P1526, “Recommended Practice for Testing the Performance of Stand-Alone Photovoltaic Systems” [1]. In January 2003, the recommended practice passed a ballot initiative with 91% affirmative votes. IEEE P1526 provides test methods and procedures to determine the performance of stand-alone PV systems.

1. Introduction

In January 2003, the recommended practice, IEEE (Institute of Electrical and Electronic Engineers) P1526, “Recommended Practice for Testing the Performance of Stand-Alone Photovoltaic Systems,” passed a ballot initiative with 91% affirmative votes. This recommended practice provides test methods and procedures to determine the performance of stand-alone PV systems. Forty-one people from the PV industry, universities, national laboratories, and of general PV interest signed up to vote. The ballot received 90% returns and 91% affirmative votes (exceeding the 75% affirmative vote requirement). There were many constructive comments and only three negative ballots. Negative ballots must be resolved before the recommended practice can go to the IEEE Standards Board for final approval.

Work on this document began in 1998 under the sponsorship of IEEE SCC21 Standards Coordinating Committee on Fuel Cells, Photovoltaics, Dispersed Generation, and Energy Storage. At the same time, the International Electrotechnical Commission Technical Committee 82 (IEC TC82) initiated IEC Project 62124, “Photovoltaic Stand-Alone Systems - Design Verification” [2]. The IEC document focuses more on indoor testing, whereas the IEEE document focuses on outdoor testing.

This work is based on research that has been conducted on stand-alone PV systems tested at the National Renewable Energy Laboratory (NREL); Sandia National Laboratory, Albuquerque, NM; Southwest Technology Development Institute (SWTDI), Las Cruces, NM; Florida Solar Energy Center (FSEC), Cocoa, FL; Photovoltaics for Utility Scale Applications (PVUSA), Davis, CA; and Groupement Energetique de Cadarache (GENEC), France. Approval of IEEE P1526 will provide certification bodies such as Powermark and PV Global Approval Program (PVGAP) with a standardized tool for certifying PV systems.

2. IEEE P1526 Overview

The majority of problems in stand-alone PV systems tend to fall into one of three areas: 1) Poor design, or selection of inferior or inappropriate components by the system designer; 2) Poor installation of the PV system by untrained or inexperienced system installers; 3) Improper use, or lack of maintenance, of the PV system by the user. IEEE P1526 addresses the first point.

The Scope and Purpose of IEEE P1526 follow:

Scope: The test methods and procedures included in this document cover stand-alone PV systems. Procedures provided are for conducting performance testing of individual components and complete systems. The methodology includes testing the system outdoors in prevailing conditions and indoors under simulated conditions.

Purpose: This recommended practice provides test methods and procedures for determining stand-alone PV system performance and conducting design verification. Test procedures provided in this document are intended to assist designers, manufacturers, system integrators, users, and laboratories in conducting these performance tests.

The procedures provide PV system design verification. The tests basically cover the following items: verify the manufacturer’s specifications; ensure the system and load operate as expected; ensure the PV array is capable of recharging the battery; determine any significant change in the usable battery capacity (UBC); and determine the system’s autonomous run time.

IEEE P1526 provides test methods and procedures for assessing the performance of stand-alone PV systems, which comprise PV modules, charge controller, batteries, and loads. These tests evaluate the adequacy of the system design and performance claims made by the system designer. It takes about one month to complete the tests.

3. Upcoming Changes and Future Work

Based on the comments received from the negative ballots, some changes that will be incorporated into the next draft (Draft 7) of IEEE P1526 will include: clarifying the intended audience and intent of the procedures; specifying that the PV system must have a battery to conduct these tests; recharging the battery at the end of the procedures; a better definition of what constitutes a properly operating load; specifying tighter tolerances for voltage and current measurements; and a better description of the decision-

making process as to whether or not the PV system has passed or failed the tests.

Future work will involve validating the procedures at different geographic locations after the comments have been incorporated. An intercomparison study of the results obtained at these locations should also be conducted. Ultimately, we need to be able to predict a system's performance in any location at any time of the year based on the tests performed at another location at another time of the year. NREL will be coordinating testing efforts with the international, as well as with the national, PV community.

After incorporating comments, the updated document will go out for a recirculation ballot. Final approval from the IEEE Standards Board is expected by the summer of 2003.

4. Summary

Developing standardized test methods and procedures to evaluate the performance of PV systems will encourage

product quality and increase confidence in these systems. As confidence in PV systems increases, the successful commercialization of PV will grow internationally. IEEE P1526, "Recommended Practice for Testing the Performance of Stand-Alone Photovoltaic Systems" will play a strong role in this growth.

5. Acknowledgement

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REFERENCES

- [1] "Recommended Practice for Testing the Performance of Stand-Alone Photovoltaic Systems." ANSI/IEEE PAR 1526 Draft 6 Revised October 2002. New York, NY: The Institute of Electrical and Electronic Engineers.
- [2] "Photovoltaic Stand-Alone Systems – Design Verification." December 2002. IEC 62124. Geneva, Switzerland. International Electrotechnical Commission.

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