TECHNICAL REPORT

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Solar Energy — Field Pyranometers — Recommended practice for use

Énergie solaire — Pyranomètres de champ — Pratique recommandée pour l'emploi

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Contents

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 9901, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 180, *Solar energy*.

The scope of ISO/TC 180/SC 1 is the measurement and recording of climatic data in relation to solar energy utilization. This Technical Report on recommended practice for the use of field pyranometers has been prepared as an adjunct to the work of ISO/TC 180/SC 1 on the calibration and specification of pyranometers.

Annexes A, B and C of this Technical Report are for information only.

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Solar energy — Field pyranometers — Recommended practice for use

1 Scope

This Technical Report gives recommended practice for the use of field pyranometers in solar energy applications (e.g. testing of solar collectors or other devices, and monitoring of solar systems). It is applicable for both indoor and outdoor use of pyranometers, when measuring global and reflected solar radiation, or radiation from a solar simulator. The measurements may be carried out on either a horizontal or an inclined surface, and the pyranometer may be combined with a sun-shading device to measure diffuse radiation.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Technical Report. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Technical Report are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 9060:1990[1)], *Solar energy — Specification and classification of instruments for measuring hemispherical solar and direct solar radiation.*

ISO 9847:—[1)], *Solar energy — Calibration of field pyranometers by comparison to a reference pyranometer.*

3 Definitions

For the purposes of this Technical Report, the definitions given in ISO 9060 apply.

1) To be published.

4 Pyranometer selection

4.1 Selection related to pyranometer type

There are several criteria for selection of the pyranometer type as follows:

a) task-specific criteria, such as the accuracy requirements for the selected incident angle and temperature ranges and maximal response time;

b) operational criteria, such as dimensions, weight, stability and maintenance;

c) economic criteria, such as when networks have to be equipped.

For solar energy applications, only thermoelectric and photoelectric instruments should be used. Thermoelectric pyranometers are generally more accurate over a wide range of conditions. Solar photovoltaic cells (otherwise known as Silicon-pyranometers) also offer a few advantages; they are inexpensive, small in size, have a fast response time and, if properly designed and mounted, a good cosine response. When overall accuracy requirements are not too high, or where constant spectrum conditions exist (as with artificial sources), they may be used to measure the incoming radiation when calibrated under the working conditions.

NOTE 1 First class instruments are not necessary for all applications.

4.2 Selection related to the measuring specifications

As a first step, all possible ranges of measuring parameters (temperature, irradiance, angle of incidence, tilt angle) should be compiled. It should be remembered that the ranges of measuring parame-