FINAL DRAFT
Technical Specification

ISO/DTS 63092-3

ISO/TC **160**

Secretariat: **BSI**

Voting begins on:
2026-01-23

Voting terminates on:
2026-03-20

Photovoltaics in buildings —

Part 3:
Evaluation methodology of SHGC for Building integrated photovoltaic modules with various designs

Member bodies are requested to consult relevant national interests in IEC/TC 82 before casting their ballot to the e-Balloting application.

This draft is submitted to a parallel vote in ISO and in IEC.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

Reference number
ISO/DTS 63092-3:2026(en)

© ISO 2026



COPYRIGHT PROTECTED DOCUMENT

© ISO 2026

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

CONTENTS

FOREWORD 2
INTRODUCTION 4
1 Scope 5
2 Normative references 5
3 Terms and definitions 6
3.1 Terms 6
3.2 Symbols and subscripts 6
4 Test samples and equipment 7
4.1 Test samples 7
4.2 Measurement equipment 8
4.2.1 Metering box 8
4.2.2 Solar simulator 8
4.2.3 Electrical load devices 8
4.2.4 MPPT device 8
4.2.5 I-V curve tracer 9
5 Test procedures 9
5.1 General principle 9
5.2 Further specifications 9
5.2.1 Environmental conditions 9
5.2.2 Surface temperature 9
5.2.3 Ambient temperature 10
5.3 Test sample traceability 10
6 Evaluation of g value of subject module 10
6.1 Procedure for g-value evaluation 10
6.2 Determination of $g_{\mathrm{ts,oc}}$ and $g_{\mathrm{ts,mpp}}$ 10
6.3 Evaluation of g value for subject modules with arbitrary cell area ratio 11
7 Test report 12
Bibliography 13

Figure 1 – Standard test sample and transparent test sample 7
Figure 2 – Cell area ratio dependence of g values under open circuit and maximum power point conditions ($g_{\mathrm{m,oc}}$ and $g_{\mathrm{m,mpp}}$, respectively) 11

Table 1 – Symbols and units 7
Table 2 – Subscripts 7

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

Photovoltaics in buildings - Part 3: Determination methodology for the solar heat gain coefficient of building-integrated photovoltaic modules

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63092-3 has been prepared by subcommittee IEC technical committee 82: Solar photovoltaic energy systems, in collaboration with ISO technical committee 160: Glass in building. It is a Technical Specification.

It is published as a double logo Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
82/XX/DTS	82/XX/RVDTS

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 63092 series, published under the general title *Photovoltaics in buildings*, can be found on the IEC website.

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

– reconfirmed,
– withdrawn, or
– revised.

INTRODUCTION

IEC 63092-1 and IEC 63092-3 describe general requirements for building-integrated photovoltaic (BIPV) modules and systems, respectively. This document describes specific requirements for the calorimetric determination of the g value for various designs of BIPV modules and provides complementary information to IEC 63092-1.

BIPV modules are often custom made and the design qualification is complicated. In particular, g-value measurements for construction components are made on test samples with dimensions which are different to those specified for PV modules in IEC test standards. It is important for manufacturers and users to use a simplified test method requiring a small number of test specimens that provides applicable results to a variety of BIPV modules consisting of identical components but varying in the effective cell area ratio.

The test method consists of two successive steps, g-value evaluation for transparent test samples with the same glazing and encapsulant components as the BIPV modules, but without solar cells or interconnectors, and g-value evaluation for BIPV modules with a standard size in the open circuit and maximum power point states. By using data for these samples, the g values for any effective PV cell area ratio can be obtained by interpolation, corresponding to the g values for BIPV modules with the same cell type and glazing configuration, but with different heights, widths and cell configurations.

Just as ISO 9050 and the ISO 19467 series exist in parallel for determining the g value of architectural glazing and serve different purposes, there is value in having both approaches standardized for BIPV glazing. The component-based ISO 9050 (and its proposed future BIPV annex) is useful if the solar heat gain coefficient (SHGC or g value) is used for multi-pane glazing units which can be well characterized by optical measurements at normal incidence. It is not applicable if the components are strongly light-scattering or if the g value is used for other angles of incidence or if any components have a non-planar, non-parallel geometry. These are cases where a calorimetric method of the whole unit is valuable, particularly for building energy calculations. The same consideration applies to standards addressing the g value of BIPV modules.

NOTE A component-based method to determine the g value of BIPV modules is already documented in prEN 410:2024[1]. It is based on spectral measurements of the optically different components of a BIPV module and the photovoltaic conversion efficiency of the BIPV module. It is anticipated that this method will also be included in the future edition of ISO 9050.This method can be applied if it is feasible to carry out separate spectral measurements of the optically different areas of a BIPV module, e.g. the area covered by PV cells and the transparent areas between the PV cells. According to the papers by [1] and [2][2], results obtained by applying both methods agree within experimental error.

---

1 Under preparation.

2 Numbers in square brackets refer to the Bibliography.

1 Scope

This part of IEC 63092 is intended to provide a versatile method to determine the solar heat gain coefficient (SHGC or g value) of BIPV modules with a variety of designs.

It addresses the calorimetric determination of the g value for BIPV modules by using the hot box method or the cooled plate method in accordance with ISO 19467 and ISO 19467-2. The effect on the g value, of extracting photovoltaically generated electricity from the BIPV module in the maximum power point state, is taken into account.

This document applies to BIPV modules as defined in IEC 63092-1 and specifically to BIPV modules with different effective cell area ratios but consisting of identical components such as cells, interconnectors, encapsulation and front/back sheets. This evaluation method is applicable to all PV cell technologies and includes coloured BIPV modules.

NOTE The solar heat gain coefficient is known by various names (SHGC, g value, solar factor, total solar energy transmittance, etc.) depending on the country and region. These terms are all used to describe the same quantity; small differences can be caused by different reference conditions (e.g. differences in the reference solar spectrum). In this document, the quantity is referred to as the g value.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60891:2021, *Photovoltaic devices - Procedures for temperature and irradiance corrections to measured I-V characteristics*

IEC 60904-1, *Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics*

IEC 60904-9, *Photovoltaic devices – Part 9: Classification of solar simulator characteristics*

IEC 61215-1, *Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements*

IEC 61215-2, *Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures*

IEC TS 61836, *Solar photovoltaic energy systems - Terms, definitions and symbols*

IEC 63092-1, *Photovoltaics in buildings - Part 1: Requirements for building-integrated photovoltaic modules*

IEC 63092-2, *Photovoltaics in buildings - Part 2: Requirements for building-integrated photovoltaic systems*

ISO 9050, *Glass in building – Determination of light transmittance, solar direct transmittance, total solar energy transmittance, ultraviolet transmittance and related glazing factors*

ISO 9845-1, *Solar energy - Reference solar spectral irradiance at the ground at different receiving conditions - Part 1: Direct normal and hemispherical solar irradiance for air mass 1 ,5*

ISO 19467:2017, *Thermal performance of windows and doors - Determination of solar heat gain coefficient using solar simulator*

ISO 19467-2:2021, *Thermal performance of windows and doors - Determination of solar heat gain coefficient using solar simulator - Part 2: Centre of glazing*

3 Terms and definitions

3.1 Terms

For the purposes of this document, the terms and definitions given in IEC 61215-1, IEC 61215-2, IEC 63092-1, IEC 63092-2, IEC TS 61836, ISO 19467, ISO 19467-2 and ISO 9050 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/

– ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
subject module
BIPV module with the same glazing configuration, module type, height, width and thickness as the actual product for which the determined g value is declared

3.1.2
standard test sample
sample of approximately 1 m x 1 m which includes all the components of the actual module product, using all key materials and subassemblies

Note 1 to entry: The standard test sample shall have the same properties as the actual product: glazing configuration, glass type, glass thickness, glass colour, PV cell type, PV cell thickness, PV cell colour, PV cell shape, distance between PV cells (gap) within a PV module, encapsulant type, encapsulant thickness, number of encapsulant sheets, encapsulant colour, interconnector width interconnector type, interconnector thickness, and other parts within BIPV module.

3.1.3
transparent test sample
sample of approximately 1 m x 1 m with the same glazing configuration and components as the actual product, but without photovoltaic cells or interconnectors

3.1.4
effective cell area ratio
ratio of area of PV cells to the effective aperture area of the standard test sample or the actual product

3.1.5
effective aperture area
area of the standard test sample or the actual product, based on the external dimensions (H x W)

3.2 Symbols and subscripts

Symbols and subscripts of this document are shown in Table 1 and Table 2.

Table 1 – Symbols and units

Symbol	Quantity	unit
A	Area	m^2
g	Solar heat gain coefficient (also known as total solar energy transmittance, solar factor or *g* value)	-
P	Power	W
I	Current	A
V	Voltage	V

Table 2 – Subscripts

Subscripts	Significance
m	BIPV subject module (actual product, for which the g value is to be determined)
ts	Test sample
oc	Open circuit
sc	Short circuit
mpp	Maximum power point

4 Test samples and equipment

4.1 Test samples

The standard test samples of the BIPV module shall include all the components used for actual operation and be able to generate and supply power. In designing and manufacturing the samples, the manufacturer shall meet all quality-relevant and reliability-related requirements for electrical, mechanical, and thermal characteristics. The transparent test sample used for calibration shall be the same in thickness, materials, and glazing configuration as the BIPV module without the components involved in power generation such as PV cells and interconnectors, i.e. if the glazing configuration of the BIPV module is a double-glazed unit with an air-filled cavity, the transparent glass reference sample shall also be a double-glazed unit with an air-filled cavity of the same thickness. See Figure 1.

Dimensions in millimetres

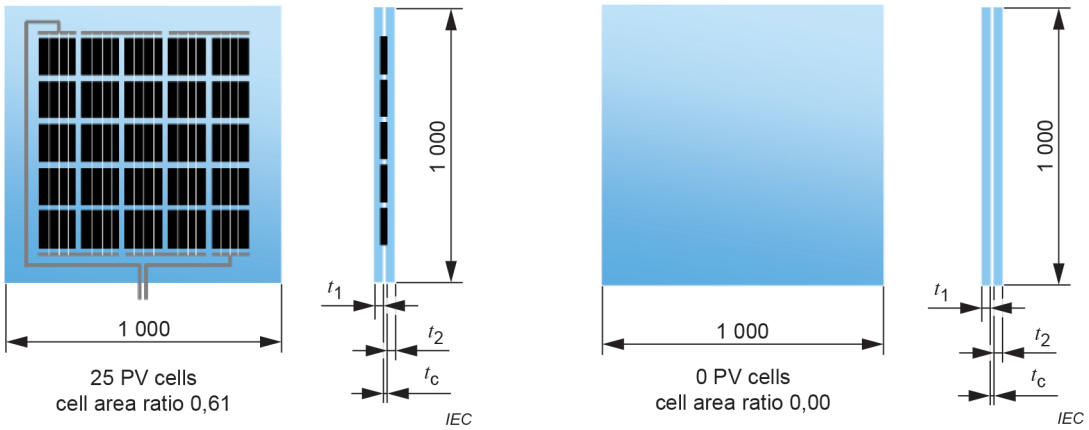


Figure 1 – Standard test sample and transparent test sample