

BS EN ISO 22975-2:2016



BSI Standards Publication

Solar energy — Collector components and materials

Part 2: Heat-pipes for solar thermal application — Durability and performance
(ISO 22975-2:2016)



National foreword

This British Standard is the UK implementation of EN ISO 22975-2:2016.

The UK participation in its preparation was entrusted to Technical Committee RHE/25, Solar Heating.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2016.
Published by BSI Standards Limited 2016

ISBN 978 0 580 80601 8

ICS 27.160

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2016.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

English Version

**Solar energy - Collector components and materials - Part 2:
Heat-pipes for solar thermal application - Durability and
performance (ISO 22975-2:2016)**

Énergie solaire - Composants et matériaux du
collecteur - Partie 2: Caloduc pour application
thermique solaire - Durabilité et performance (ISO
22975-2:2016)

Solarenergie - Kollektorbauteile und -materialien - Teil
2: Wärmerohre für solarthermische Anwendungen -
Beständigkeit und Leistungsfähigkeit (ISO 22975-
2:2016)

This European Standard was approved by CEN on 12 September 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

This document (EN ISO 22975-2:2016) has been prepared by Technical Committee ISO/TC 180 "Solar energy" in collaboration with Technical Committee CEN/TC 312 "Thermal solar systems and components" the secretariat of which is held by ELOT.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2017, and conflicting national standards shall be withdrawn at the latest by April 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 22975-2:2016 has been approved by CEN as EN ISO 22975-2:2016 without any modification.

**Solar energy — Collector components
and materials —**

**Part 2:
Heat-pipes for solar thermal
application — Durability and
performance**

Énergie solaire — Composants et matériaux du collecteur —

*Partie 2: Caloduc pour application thermique solaire — Durabilité et
performance*



Reference number
ISO 22975-2:2016(E)

AVA Documents
Document Sharing Hub
© ISO 2016



COPYRIGHT PROTECTED DOCUMENT

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, 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
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Test overview	2
5 Durability	3
5.1 High temperature resistance test	3
5.1.1 Objective	3
5.1.2 Test conditions	3
5.1.3 Apparatus	3
5.1.4 Procedure	3
5.1.5 Results	3
5.2 Freeze resistance test	4
5.2.1 Objective	4
5.2.2 Test conditions	4
5.2.3 Apparatus	4
5.2.4 Procedure	4
5.2.5 Results	5
6 Performance	5
6.1 Starting temperature of heat-pipes	5
6.1.1 Principle	5
6.1.2 Test conditions	5
6.1.3 Apparatus	5
6.1.4 Procedure	5
6.1.5 Results	6
6.2 Temperature uniformity of heat-pipes	6
6.2.1 Principle	6
6.2.2 Test conditions	6
6.2.3 Apparatus	6
6.2.4 Procedure	6
6.2.5 Results	7
6.3 Heat transfer power of heat-pipes	7
6.3.1 Principle	7
6.3.2 Test conditions	7
6.3.3 Apparatus	8
6.3.4 Procedure	10
6.3.5 Results	11
Annex A (informative) Typical configuration of a heat-pipe for solar thermal application	12
Annex B (normative) Test reports on a heat-pipe for solar thermal application	13
Bibliography	22

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 procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 180, *Solar energy*.

ISO 22975 consists of the following parts, under the general title *Solar energy — Collector components and materials*:

- *Part 1: Evacuated tube — Durability and performance*
- *Part 2: Heat-pipes for solar thermal application — Durability and performance*
- *Part 3: Absorber surface durability*

The following parts are under preparation:

- *Part 5: Insulation material durability and performance*

Introduction

This part of ISO 22975 specifies test methods for durability and performance of heat-pipes for solar thermal application.

This part of ISO 22975 is applicable to all heat-pipes for use with both evacuated tubes and flat plate collectors.

For each durability and performance test, its objective, principle, test condition, apparatus, procedure and test results are specified.

For all the tests specified in this part of ISO 22975, a complete heat-pipe is required.

Solar energy — Collector components and materials —

Part 2:

Heat-pipes for solar thermal application — Durability and performance

1 Scope

This part of ISO 22975 specifies definitions and test methods for durability and performance of heat-pipes for solar thermal application.

This part of ISO 22975 is applicable to heat-pipes for use with evacuated tubes, including glass-metal sealed evacuated tubes and double-glass evacuated tubes, as well as with flat plate collectors.

This part of ISO 22975 provides test methods for determining durability of the heat-pipe, including high temperature resistance and freeze resistance.

This part of ISO 22975 also provides test methods for measuring performance of the heat-pipe, including starting temperature, temperature uniformity and heat transfer power of the heat-pipe.

This part of ISO 22975 is only applicable to gravity heat-pipes.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9488, *Solar energy — Vocabulary*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9488 and the following apply.

3.1

heat-pipe

heat transfer element, utilizing latent heat of phase-change for heat transfer

3.2

gravity heat-pipe

heat-pipe (3.1) without a capillary wick inside, in which the liquefied *working fluid* (3.6) returns from *condenser* (3.4) to *evaporator* (3.3) due to its own weight

3.3

evaporator

part of a *heat-pipe* (3.1), where the liquefied *working fluid* (3.6) absorbs heat, vaporizes and becomes the vaporized working fluid