



**NSAI**  
Standards

Irish Standard Recommendation  
S.R. CWA 17726:2021

High temperature accelerated ageing of  
advanced ceramic specimens for solar  
receivers and other applications under  
concentrated solar radiation

**S.R. CWA 17726:2021**

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

*This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):*

*NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.*

*This document is based on:*

CWA 17726:2021

*Published:*

2021-06-23

*This document was published  
under the authority of the NSAI  
and comes into effect on:*

2021-07-12

ICS number:

27.160

81.060.30

NOTE: If blank see CEN/CENELEC cover page

NSAI  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

Sales:  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

## National Foreword

S.R. CWA 17726:2021 is the adopted Irish version of the European Document CWA 17726:2021, High temperature accelerated ageing of advanced ceramic specimens for solar receivers and other applications under concentrated solar radiation

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

For relationships with other publications refer to the NSAI web store.

**Compliance with this document does not of itself confer immunity from legal obligations.**

*In line with international standards practice the decimal point is shown as a comma (,) throughout this document.*

This page is intentionally left blank

**CEN**

**CWA 17726**

**WORKSHOP**

June 2021

**AGREEMENT**

---

ICS 27.160; 81.060.30

English version

## High temperature accelerated ageing of advanced ceramic specimens for solar receivers and other applications under concentrated solar radiation

This CEN Workshop Agreement has been drafted and approved by a Workshop of representatives of interested parties, the constitution of which is indicated in the foreword of this Workshop Agreement.

The formal process followed by the Workshop in the development of this Workshop Agreement has been endorsed by the National Members of CEN but neither the National Members of CEN nor the CEN-CENELEC Management Centre can be held accountable for the technical content of this CEN Workshop Agreement or possible conflicts with standards or legislation.

This CEN Workshop Agreement can in no way be held as being an official standard developed by CEN and its Members.

This CEN Workshop Agreement is publicly available as a reference document from the CEN Members National Standard Bodies.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, 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: Rue de la Science 23, B-1040 Brussels**

## CWA 17726:2021 (E)

<b>Contents</b>	<b>Page</b>
European foreword.....	3
Introduction .....	5
1 Scope .....	5
2 Normative references .....	5
3 Terms and definitions .....	6
4 Test layout description .....	7
4.1 Test pieces or slabs.....	7
4.1.1 General.....	7
4.1.2 Shape and dimensions.....	7
4.1.3 Environmental conditions .....	8
4.2 Test platform .....	8
4.2.1 General.....	8
4.2.2 Requirements for the test platform.....	8
4.2.3 Post test .....	9
5 Procedure.....	9
5.1 General.....	9
5.2 Flux shape .....	9
5.3 Heating and cooling rates.....	10
5.4 Number of cycles .....	11
5.5 Temperature measurement.....	11
5.6 Incident flux measurement .....	11
6 Test reporting.....	12
7 Analysis.....	12
7.1 General.....	12
7.2 Mechanical analyses.....	13
7.3 Optical analyses .....	14
7.4 Thermal oxidation degradation.....	14
7.5 Microstructural analysis.....	15
Bibliography.....	16

## European foreword

This CEN Workshop Agreement (CWA 17726:2021) has been developed in accordance with the CEN-CENELEC Guide 29 “CEN/CENELEC Workshop Agreements – A rapid prototyping to standardization” and with the relevant provisions of CEN/CENELEC Internal Regulations – Part 2. It was approved by a Workshop of representatives of interested parties on 2020-12-15, the constitution of which was supported by CEN following the public call for participation made on 2020-01-31. However, this CEN Workshop Agreement does not necessarily include all relevant stakeholders.

The final text of this CEN Workshop Agreement was provided to CEN for publication on 2021-05-24.

Results incorporated in this CWA received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 721045.

The following organizations and individuals developed and approved this CEN Workshop Agreement:

- Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT) – Plataforma Solar de Almería (PSA), Jesús Fernández-Reche – Chairperson
- Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT) – Plataforma Solar de Almería (PSA), Inmaculada Cañadas – Chairperson
- Asociación Española de Normalización (UNE), Ana Mariblanca – Secretary
- LiqTech Ceramics A/S, Víctor M. Candelario
- R2M Solution, Fabio Aprà
- Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile (ENEA), Claudio Mingazzini
- Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile (ENEA), Matteo Scafè
- University of Oxford, James Marrow
- EngiCer SA, Luca Ferrari
- R2M Solution, Raymond Sterling
- Commissariat à l'Énergie Atomique et aux Énergies Alternatives (CEA), Estelle Le Baron
- Instituto de Tecnología Cerámica (ITC), José Planelles
- Instituto de Tecnología Cerámica (ITC), Vicente Lázaro

## **CWA 17726:2021 (E)**

Attention is drawn to the possibility that some elements of this document may be subject to patent rights. CEN/CENELEC policy on patent rights is described in CEN-CENELEC Guide 8 “Guidelines for Implementation of the Common IPR Policy on Patent”. CEN shall not be held responsible for identifying any or all such patent rights.

Although the Workshop parties have made every effort to ensure the reliability and accuracy of technical and nontechnical descriptions, the Workshop is not able to guarantee, explicitly or implicitly, the correctness of this document. Anyone who applies this CEN Workshop Agreement shall be aware that neither the Workshop, nor CEN, can be held liable for damages or losses of any kind whatsoever. The use of this CEN Workshop Agreement does not relieve users of their responsibility for their own actions, and they apply this document at their own risk. The CEN Workshop Agreement should not be construed as legal advice authoritatively endorsed by CEN/CENELEC.



## Introduction

Concentrated solar power (CSP) is an important building block in installing a secure, competitive and sustainable energy system.

Advanced materials solutions for NEXT generation high efficiency concentrated solar power (CSP) TOWER systems (NEXTOWER) project is a four-year research and development project, funded by the European Commission, which aims at demonstrating high-performance durable materials for the next generation of concentrated solar power (CSP) air-based tower systems, making them commercially competitive in the energy market beyond 2020.

NEXTOWER comprises two main parts: steel and ceramic. The main objective related to ceramic is to develop new mechanically tough and highly thermally conductive ceramic receivers, working under extreme thermal cycling without failure at a maximum operating temperature of up to 1 400 °C and delivering up to 25 years of continued operation.

A general objective in NEXTOWER is the exploitation and standardization, addressing the integration of NEXTOWER in the standardization system.

Some of the results obtained in NEXTOWER regarding the use of advanced ceramics are:

1. Innovative ceramic for high-temperature open volumetric receivers based on all-SiC honeycomb manufactured by a mix of extrusion and slip casting through re-crystallization SiC more resistant to oxidation; better ceramics for high-temperature receivers, with superior thermal properties and reliability. Ceramic receivers optimized for oxidation, in terms of porosity and strength.
2. Innovative ceramic for high-temperature open volumetric receivers based on more flexible siliconized silicon carbide (Si-SiC) multiparts made by additive manufacturing (3D printing), especially designed for higher toughness, higher thermal conductivity and thermal shock resistance through a more open structure, with an optimized joining technique, improving lifetime and avoiding interfacial cracking.
3. Coating and surface treatments to improve thermomechanical properties and emissivity.
4. Proposal to amend ISO 18755 “Fine ceramics (advanced ceramics, advanced technical ceramics) – Determination of thermal diffusivity of monolithic ceramics by laser flash method”.
5. This CWA defines a methodology for testing the performance of the material ceramic materials and will be one of the standardization results. Both the standards community and NEXTOWER partners will benefit from it.

## 1 Scope

This document defines the requirements, operation and analysis for high temperature accelerated ageing of ceramic specimens for solar receivers and other applications under concentrated solar radiation, reaching a solar concentration up to 1 MW/m<sup>2</sup> peak and temperatures up to 1 400 °C.

This document also describes the structural and resistance post analysis of the irradiated samples.

## 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.

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- Looking for additional Standards? Visit Intertek Inform Infostore
  - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-