

This is a preview of "BS EN 16980-1:2021". [Click here to purchase the full version from the ANSI store.](#)



BSI Standards Publication

Photocatalysis — Continuous flow test methods

Part 1: Determination of the degradation of nitric oxide (NO) in the air by photocatalytic materials

This is a preview of "BS EN 16980-1:2021". [Click here to purchase the full version from the ANSI store.](#)

National foreword

This British Standard is the UK implementation of EN 16980-1:2021. It supersedes PD CEN/TS 16980-1:2016, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RPI/13, Advanced technical ceramics.

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

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2021
Published by BSI Standards Limited 2021

ISBN 978 0 539 11989 3

ICS 13.040.20; 25.220.20; 87.040; 87.060.20; 91.100.10

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 September 2021.

Amendments/corrigenda issued since publication

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

This is a preview of "BS EN 16980-1:2021". [Click here to purchase the full version from the ANSI store.](#)

EUROPÄISCHE NORM

September 2021

ICS 13.040.20; 87.040; 87.060.20; 91.100.10

Supersedes CEN/TS 16980-1:2016

English Version

Photocatalysis - Continuous flow test methods - Part 1: Determination of the degradation of nitric oxide (NO) in the air by photocatalytic materials

Photocatalyse - Méthode d'essai en flux continu -
Partie 1 : Détermination de la dégradation du
monoxyde d'azote (NO) dans l'air par des matériaux
photocatalytiques

Photokatalyse - Prüfverfahren mit kontinuierlichem
Durchfluss - Teil 1: Bestimmung des Abbaus von
Stickstoffmonoxid (NO) aus der Luft durch
photokatalytische Werkstoffe

This European Standard was approved by CEN on 9 May 2021.

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, 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

This is a preview of "BS EN 16980-1:2021". [Click here to purchase the full version from the ANSI store.](#)

Contents	Page
European foreword	3
1 Scope	5
2 Normative references	5
3 Terms, definitions and abbreviations	5
3.1 Terms and definitions	5
3.2 Abbreviations and symbols	6
4 Principle	8
5 Interferences	8
6 Apparatus	8
6.1 General.....	8
6.2 Gas mixture preparation system	8
6.3 Illumination and measuring system	9
7 Sample preparation	14
7.1 Precaution.....	14
7.2 Sample characteristics	15
7.3 Conditioning.....	15
8 Measurement of concentrations	15
8.1 General.....	15
8.2 Measurement of the initial concentration of nitrogen oxides before entering the photochemical reactor	16
8.3 Conversion without sample.....	16
8.4 Conversion in the dark and in the presence of sample	17
8.5 Conversion under illumination in the presence of sample.....	17
9 Calculation of photocatalytic degradation rate	18
9.1 The observed rate of photocatalytic degradation	18
9.2 Intrinsic rate of photocatalytic transformation.....	19
10 Optional part for the use of different fan speeds	19
10.1 General.....	19
10.2 Conversion under illumination in the presence of sample at different fan speeds	19
10.3 Calculation of photocatalytic degradation rate at different fan speeds.....	20
11 Acceptability ranges of main test parameters	21
12 Test report	22
Annex A (informative) Typical trend of NO, NO₂ and NO_x concentrations during a photocatalytic test at nominal fan speed	24
Annex B (informative) Typical trend of NO, NO₂ and NO_x concentrations during a photocatalytic test using different fan speeds	25
Annex C (informative) Example of test for the control of mass transfer limitation	26
Annex D (informative) Typical Ohmic response of the fan	27
Bibliography	28

This is a preview of "BS EN 16980-1:2021". [Click here to purchase the full version from the ANSI store.](#)

European foreword

This document (EN 16980-1:2021) has been prepared by Technical Committee CEN/TC 386 "Photocatalysis", the secretariat of which is held by AFNOR.

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 March 2022, and conflicting national standards shall be withdrawn at the latest by March 2022.

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

This document supersedes CEN/TS 16980-1:2016.

EN 16980-1:2021 includes the following significant technical changes with respect to CEN/TS 16980-1:2016:

- 3.2
 - addition of: "A sample illuminated surface area in m²"
 - deletion of: "CIN concentration at reactor inlet" and "Fv,I fan flow at ith potential"
 - modification of abbreviations: "F Flow" to "Q Flow", "V0" to "U₀", "Vmin" to "U_{min}", "MM" to "M"
- 6.3 (before 6.2) Modification of Figure 2
- 7.1 updated sentence: "Samples shall be eventually preconditioned following the supplier advices."
- 8.1 updated formula:
$$C \left(\mu\text{g m}^{-3} \right) = 10^3 \frac{C \left(\text{ppmv} \right) \times M \times P}{R \times T} = \text{ppmv} \times k$$
- 12 (before 11):
 - addition of: "a) international Standard used (including its year of publication)";
 - "b) any deviations from the procedure";
 - "c) the date of the test";
- Annex A: change of figure "Typical trend of NO, NO₂ and NO_x concentrations during a photocatalytic test at nominal fan speed"
- Annex B: change of figure "Typical trend of NO, NO₂ and NO_x concentrations during a photocatalytic test at nominal fan speed".

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: 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

This is a preview of "BS EN 16980-1:2021". [Click here to purchase the full version from the ANSI store.](#)

Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

This is a preview of "BS EN 16980-1:2021". Click here to purchase the full version from the ANSI store.

1 Scope

This document specifies a method for assessing the performance of photocatalytic inorganic materials contained in cement mortars and/or limes or ceramic-based matrices, paints or materials deposited as thin films or coatings on a variety of substrates for the photocatalytic abatement of nitric oxide in the gas phase. This method does not apply to the assessment of samples to be applied with flow perpendicular to the surface or flow permeating the surface itself as polymeric and paper filters, honeycomb structures and suchlike.

The performance for the photocatalytic sample under test is evaluated by measuring the degradation rate of nitric oxide (NO) using the method specified herein. The photocatalytic abatement rate is calculated from the observed rate by eliminating the effects of mass transfer. The intrinsic photocatalytic abatement rate is an intrinsic property of the material tested and makes it possible to distinguish the photocatalytic activities of various products with an absolute scale defined with physical and engineering meaning.

For the measurements and calculations described in this document the concentration of nitrogen oxides (NO_x) is defined as the stoichiometric sum of nitric oxide (NO) and nitrogen dioxide (NO₂).

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.

CEN/TS 16599, *Photocatalysis — Irradiation conditions for testing photocatalytic properties of semiconducting materials and the measurement of these conditions*

EN ISO 9169, *Air quality — Definition and determination of performance characteristics of an automatic measuring system (ISO 9169)*

ISO 7996:1985, *Ambient air — Determination of the mass concentration of nitrogen oxides — Chemiluminescence method*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms, definitions and abbreviations apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1.1

concentration of nitrogen oxides

NO_x

stoichiometric sum of nitric oxide (NO) and nitrogen dioxide (NO₂)

Note 1 to entry: For grade 999 nitrogen or air, the purity of the gas should be equal at least to 99,9 %.