

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

## EESTI STANDARDI EESSÕNA

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ICS 13.040.20, 87.040, 87.060.20, 91.100.10

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EUROPEAN STANDARD

EN 16980-1

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EUROPÄISCHE NORM

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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.

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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.

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**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## 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of an identical text or by endorsement, at the latest by March 2022, and conflicting national standards shall be withdrawn at the latest by March 2022.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 m<sup>2</sup>"
  - 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 "U<sub>0</sub>", "Vmin" to "U<sub>min</sub>", "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:  $C \left( \mu g m^{-3} \right) = 10^3 \frac{C(ppmv) \times M \times P}{R \times T} = ppmv \times k$
- 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, NO<sub>2</sub> and NO<sub>x</sub> concentrations during a photocatalytic test at nominal fan speed"
- Annex B: change of figure "Typical trend of NO, NO<sub>2</sub> and NO<sub>x</sub> 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

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

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## 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<sub>x</sub>) is defined as the stoichiometric sum of nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>).

## 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<sub>x</sub>

stoichiometric sum of nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>)

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