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Fine ceramics (advanced ceramics, advanced technical ceramics) — Determination of antiviral activity of semiconducting photocatalytic materials under indoor lighting environment — Test method using bacteriophage Q-beta

Céramiques techniques — Détermination de l'activité antivirale des matériaux photocatalytiques semi-conducteurs dans un environnement d'éclairage intérieur — Méthode d'essai utilisant un bactériophage Q-béta

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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).

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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 206, *Fine ceramics*.

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Introduction

This International Standard applies to testing the antiviral activity of indoor-light-active photocatalytic ceramics and other materials produced by either coating or mixing of a light-active photocatalyst. The International Standard for testing the antibacterial activity of photocatalytic materials has been published as ISO 27447 and the International Standard for testing the antibacterial activity of indoor-light-active photocatalytic materials has been published as ISO 17094. The International Standard for determination of antiviral activity of semiconducting photocatalytic materials has also been published as ISO 18061.

The test method for cloths or textiles is not included in this International Standard because of lack of indoor-light-active photocatalytic cloths or textiles. When the indoor-light-active photocatalytic cloths or textiles with antiviral activity using indoor-light-active photocatalytic activity have been developed, a test method for indoor-light-active photocatalytic cloths or textiles will be proposed with the glass adhesion method in ISO 27447.

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Fine ceramics (advanced ceramics, advanced technical ceramics) — Determination of antiviral activity of semiconducting photocatalytic materials under indoor lighting environment — Test method using bacteriophage Q-beta

WARNING — Only personnel trained in microbiological techniques should carry out tests.

1 Scope

This International Standard specifies the determination of the antiviral activity of materials that contain indoor-light-active photocatalytic materials or have indoor-light-active photocatalytic films on the surface by a test method that measures the infectivity titre of bacteriophage Q-beta after illumination with indoor light.

NOTE In the test method, the surrogate microbe is bacteriophage Q-beta, intended as a model for influenza viruses.

This International Standard is intended for use with different kinds of indoor-light-active photocatalytic materials used in construction materials, in flat sheet, board or plate shape that are the basic forms of materials for various applications. It does not include powder, granular or porous indoor-light-active photocatalytic materials.

This International Standard is applicable to indoor-light-active photocatalytic materials produced for an antiviral applications. Other types of performance of indoor-light-active photocatalytic materials, i.e. antibacterial activity, antifungal activity, decomposition of water contaminants, self-cleaning, antifogging and air purification, are not determined by this method.

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 14605, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Light source for testing semiconducting photocatalytic materials used under indoor lighting environment*

ISO 27447, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Test method for antibacterial activity of semiconducting photocatalytic materials*

ISO 80000-1, *Quantities and units — Part 1: General*

3 Terms and definitions

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

3.1
photocatalyst
substance that carries out many functions based on oxidization and reduction reactions under photoirradiation, including decomposition and removal of air and water contaminants, deodorization, and antiviral, antibacterial, antifungal, self-cleaning and antifogging actions

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3.2
indoor-light-active photocatalyst
substance that reacts with artificial light source for general lighting service (i.e. indoor lighting environment)

3.3
indoor lighting environment
environment with artificial light source for general lighting service

Note 1 to entry: Does not include sunlight.

3.4
indoor-light-active photocatalytic materials
materials in which or on which the indoor-light-active photocatalyst is added by coating, impregnation, mixing, etc.

3.5
antiviral
condition decreasing the infectivity of viruses on the surface of materials

3.6
bacteriophage
type of virus which infects bacteria

Note 1 to entry: The bacteriophage used in this International Standard is Q-beta that is one of F-specific RNA phages. The bacteriophage Q-beta is not pathogenic to humans and animals, but serves to simulate Influenza viruses that are pathogenic to humans.

3.7
plaque
visible, clear area which is theoretically the result of infection and lysis of host cells by a single viable bacteriophage

3.8
indoor-light-active photocatalyst antiviral activity value
difference between the logarithms of the total number of bacteriophage plaques on photocatalytic treated materials after indoor light illumination and on non-treated materials after indoor light illumination

Note 1 to entry: This value includes the decrease of number of bacteriophage plaques without indoor light illumination.

3.9
indoor-light-active photocatalyst antiviral activity value for indoor light illumination
difference between the logarithms of the total number of bacteriophage plaques on photocatalytic treated materials after indoor light illumination and on photocatalytic treated materials kept in a dark place

4 Symbols

A	average of titre of bacteriophage on non-treated specimens, just after inoculation
B_D	average of titre of bacteriophage on non-treated specimens, after being kept in a dark place
$B_{F\text{-}L}$	average of titre of bacteriophage on non-treated specimens, after indoor light illumination of intensity L under condition F
C_D	average of titre of bacteriophage on indoor-light-active photocatalytic treated specimens, after being kept in a dark place

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