This is a preview of BS EN 16163:2024. Click here to purchase the full version from the ANSI store.



BSI Standards Publication

Conservation of cultural heritage — Guidelines and procedures for choosing appropriate lighting for indoor exhibitions

bsi.

This is a preview of BS EN 16163:2024. Click here to purchase the full version from the ANSI store.

National foreword

This British Standard is the UK implementation of EN 16163:2024. It supersedes PD CEN/TS 16163:2014, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/560, Conservation of tangible cultural heritage.

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 2024
Published by BSI Standards Limited 2024

ISBN 978 0 539 24172 3

ICS 97.195

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 31 December 2024.

Amendments/corrigenda issued since publication

Date	Text affected

This is a preview of BS EN 16163:2024. Click here to purchase the full version from the ANSI store.

EUROPEAN STANDARD **EN 16163**

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2024

ICS 97.195

Supersedes CEN/TS 16163:2014

English Version

Conservation of cultural heritage - Guidelines and procedures for choosing appropriate lighting for indoor exhibitions

Conservation du patrimoine culturel - Lignes directrices et procédures concernant le choix d'un éclairage adapté pour les expositions en intérieur

Erhaltung des kulturellen Erbes - Leitlinien und Verfahren für die Auswahl geeigneter Beleuchtung für Innenausstellungen

This European Standard was approved by CEN on 18 November 2024.

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, Türkiye 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

© 2024 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 16163:2024 E

This is a preview of BS EN 16163:2024. Click here to purchase the full version from the ANSI store.

Contents

Page

European foreword ... 4
Introduction ... 5
1 Scope ... 6
2 Normative references ... 6
3 Terms and definitions ... 6
4 Symbols ... 15
5 The effect of light to visitor's perception ... 15
5.1 General ... 15
5.2 Visibility of details and contrasts ... 16
5.3 Colour discrimination ... 17
5.4 Glare ... 18
5.5 Reflections ... 19
6 Sensitivity of cultural property to light ... 19
6.1 General ... 19
6.2 Mechanisms of damage ... 19
6.2.1 General ... 19
6.2.2 Photochemical ... 20
6.2.3 Radiant heating ... 21
6.2.4 Biological effects ... 21
6.3 Sensitivity and classification for cultural property ... 21
7 Finding a compromise between visitor needs and conservation requirements ... 22
7.1 General ... 22
7.2 Limitations for annual luminous exposure ... 22
8 Measurements ... 24
8.1 Measurement of illuminance ... 24
8.2 Measurement of UV radiation ... 24
9 Exhibition lighting ... 25
9.1 General ... 25
9.2 Typology of lighting design ... 25
9.2.1 General ... 25
9.2.2 General lighting ... 26
9.2.3 Exhibition lighting ... 26
9.2.4 Accent lighting ... 26
9.2.5 Security lighting ... 27
9.3 Simulation and mock-ups ... 27
10 Lighting control ... 27
10.1 General ... 27
10.2 Energy efficiency ... 28
11 Maintenance and monitoring of correct lighting conditions ... 28
11.1 Actions to be taken before setting-up a lighting project ... 28
11.1.1 Preliminary actions concerning the exhibit(s) ... 28
11.1.2 Preliminary actions concerning the lighting system and set-up ... 29

This is a preview of BS EN 16163:2024. Click here to purchase the full version from the ANSI store.

11.2 Maintenance and control actions to undertake over the long term 30
11.2.1 Maintenance actions concerning the exhibit(s) 30
11.2.2 Maintenance actions concerning the lighting system 30
12 Security and cleaning 30
Annex A (informative) Characteristics of light sources 31
Annex B (informative) Glasses and films characteristics 38
Annex C (informative) Filters 39
Annex D (informative) Additional methods for the evaluation and limitation of photochemical damage for different light sources 40
Annex E (informative) Light sources and lighting systems 44
Annex F (informative) Colour rendering index, fidelity index and gamut index 45
Annex G (informative) Facility report 48
Annex H (informative) Good practices for exhibition lighting 49
Annex I (informative) Lighting management protocols 53
Bibliography 54

This is a preview of BS EN 16163:2024. Click here to purchase the full version from the ANSI store.

European foreword

This document (EN 16163:2024) has been prepared by Technical Committee CEN/TC 346 “Conservation of Cultural Heritage”, the secretariat of which is held by UNI.

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 June 2025, and conflicting national standards shall be withdrawn at the latest by June 2025.

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 16163:2014.

EN 16163:2024 includes the following significant technical changes with respect to CEN/TS 16163:2014:

Since the publication of the CEN/TS 16163 in 2014, the technology of lighting has evolved considerably and an update of the content has proven to be necessary. In addition to taking into account technological advances and new calculation methods in the field of lighting in recent years, the present version of the standard contains the elements of good practices for the exhibition lighting design, in its subjective form, as an element of museography, which had not found its place in the previous version.

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, Türkiye and the United Kingdom.

This is a preview of BS EN 16163:2024. Click here to purchase the full version from the ANSI store.

Introduction

Lighting is needed for many specific functions in museums and other cultural heritage buildings, such as research, conservation and permanent or temporary exhibitions. Lighting is one of the most important factors enabling visitors to fully enjoy works of art and other cultural property. In fact, lighting is a key medium in which visitors interpret and appreciate cultural heritage. Light is needed to see well but this can present a challenge when what is being viewed will deteriorate in the presence of light. When displaying exhibits as a part of Cultural Heritage, it is essential to consider a controlled use of light, to preserve them for the future generations. Indeed, light is an environmental factor, which is a threat to many objects. Alone or in combination with other environmental factors (temperature, humidity, pollution, etc.) light causes fading, discoloration and embrittlement of a wide range of materials. This damage is cumulative and irreversible: no conservation treatment can restore original appearance of colours and the material characteristics. Therefore, the challenge of museum exhibition lighting is to find an appropriate compromise between the long-term preservation of the object and the needs of visitors to view them within a suitable exhibition design. As an integral part of exhibition lighting, the following aspects should be considered, mentioned below without priority:

— the conservation aspect, related to the sensitivity of the exhibit at different wavelengths of the incident radiant energy, the spectral composition of the light source and the total luminous exposure;

— the visual aspect, related to the impact of lighting on the visitor experience: lighting should allow visitors to see exhibits on display, with the correct colour perceptions without glare, reflections or insufficient illumination;

— the design aspect related to the concept and position of the exhibition architecture, the point of view of the curator and all others involved in the purpose and/or didactic objectives of the exhibition.

This document uses terms defined in European and International (CIE International lighting vocabulary) terminology standards, but their definitions have been adapted to the intended users of this document.

This is a preview of BS EN 16163:2024. Click here to purchase the full version from the ANSI store.

1 Scope

This document defines the procedures as well as the means to implement adequate lighting, with regard to the exhibition lighting and the conservation policy. This also includes security and cleaning lighting. It takes visual, exhibition and conservation aspects into account and it also discusses the implications of the lighting design on the safeguarding of cultural heritage. This document gives recommendations on luminous exposure values. It aims to provide a tool for setting up a common European policy and a guide to help curators, conservators and project managers to assess the correct lighting that can ensure the safeguarding of the objects. This document covers indoor lighting for heritage objects on exhibition in both public and private sites and does not consider lighting in other cultural heritage contexts such as open-air collections, etc.

This document does not cover non-public activities such as conservation-restoration, storage, emergency lighting and research.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminology 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
accent lighting
directional lighting to emphasize a particular *exhibit* (3.19) or to draw attention to a spot in the field of vision

[SOURCE: CIE S 017/E:2020, 17-29-023, modified.]

3.2
annual luminous exposure
***H*$_{m}$**
total luminous exposure (3.49) per year

Note 1 to entry: One year of museum display is approximately 3 000 h. See also 3.34.

Note 2 to entry: The unit is expressed in lux hours per years, lx·h per year.

3.3
blue wool test
test for light fastness
certified set of eight pieces of wool each dyed with a different specific blue dye graded to fade after a specific exposure test to *light* (3.25)

Note 1 to entry: This system is usually referred to as the Blue Wool Standard (BWS) and it is used in museums to assess the radiation exposure of materials. The eight wool pieces are numbered #1 to #8, with sensitivity doubling at every step. High sensitivity is defined as materials rated #1, #2, or #3; medium as #4, #5, or #6; and