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Conservation of cultural heritage - Guidelines for design of showcases for exhibition and preservation of objects - Part 1: General instructions

Erhaltung des kulturellen Erbes - Leitfaden für die Konstruktion von Schauvitrienen zur Ausstellung und Erhaltung von Objekten - Teil 1: Allgemeine Anforderungen

Conservation du patrimoine culturel - Lignes directrices pour la conception de vitrines destinées à exposer et préserver des biens culturels culturels - Partie 1 : Exigences générales

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ICS:

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Conservation du patrimoine culturel - Lignes directrices pour la conception de vitrines destinées à exposer et préserver des biens culturels culturels - Partie 1 : Exigences générales

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (prEN 15999-1:2023) has been prepared by Technical Committee CEN/TC 346 “Conservation of cultural heritage”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 15999-1:2014.

prEN 15999-1:2023 includes the following significant technical changes with respect to EN 15999-1:2014:

— ...

EN 15999 will consist of the following parts:

- prEN 15999-1, *Conservation of cultural heritage — Guidelines for design of showcases for exhibition and preservation of objects — Part 1: General requirements*
- prEN 15999-2, *Conservation of cultural heritage — Guidelines for design of showcases for exhibition and preservation of objects — Part 2: Technical aspects*

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Introduction

The main purpose of a showcase for cultural heritage objects on exhibition is to reduce the risks of total loss, physical damage, chemical and biological deterioration (e.g. by accidents, theft, vandalism, natural disasters, humidity, temperature, dust, pollutants, light, pests).

Showcases are an important tool to preserve and protect cultural heritage objects. The role of the showcase in the preventive conservation strategy of a heritage institution needs to take into account many complex environmental variables along with the usage of the showcase. The type of showcase and its properties need to be adapted to the principal risks to objects and specific environmental conditions. A poorly constructed or selected showcase can under some circumstances cause damage to objects.

Because of the complexity of the role of the showcase for preventive conservation but also for the exhibition design, showcases need to take into account the perspectives of all stakeholders involved in the process of the procurement, e.g. curators, conservators, scientists, architects, graphic designers, lighting experts, architects, manufacturers and other decision makers.

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1 Scope

This document specifies general requirements for showcases for safe and secure display of cultural heritage objects complying with the requirements for preventive conservation. This document is only focused on so called passive showcases with unpowered climate conditioning systems, displaying the objects in ambient air. The role of the showcase in the preventive conservation is established by a risk assessment taking into account several risk factors mentioned in this document. As the design of the showcase has an influence on its properties, some general consideration about the showcase design are given. The procurement of showcase(s) and the development of the design of the showcase(s) involve all stakeholders of the project; a structured project plan is proposed.

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.

EN 16893:2018, *Conservation of Cultural Heritage - Specifications for location, construction and modification of buildings or rooms intended for the storage or use of heritage collections*

prEN 15999-2:2023, *Conservation of cultural heritage – Guidelines for design of showcases for exhibition and preservation of objects – Part 2: Technical aspects*

prEN 16163, *Conservation of Cultural Heritage - Guidelines and procedures for choosing appropriate lighting for indoor exhibitions*

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 <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

air exchange

exchange due to an airflow through gaps and openings, or molecular diffusion through permeable materials

3.2

air exchange rate

volume of showcase air exchanged per unit time divided by the total showcase volume

Note 1 to entry: Unit: 1/t

3.3**air pollutants**

airborne pollutants, such as gaseous or particulate chemical contaminants induced into the environment, which can generate corrosion, incrustation, colour fading, soiling, deterioration or other forms of damage to the objects on display

3.4**display space**

space in the showcase where the objects are displayed and which may contain other elements such as panels, supports, graphics, monitoring equipment, etc

3.5**dust**

solid particles of matter (e.g. pollen, skin, soil, sand) entrained and transported in air; and possibly being deposited on surfaces

3.6**hygrometric half-time**

time needed for the relative humidity in the showcase to move half way from its initial value to the relative humidity value in the environment

3.7**microclimate**

climate in the display space (3.4) of the showcase

3.8**moisture sorbent**

material that captures or releases moisture to control relative humidity

3.9**resistance time**

working time of the test person carrying out the manual burglary test

Note 1 to entry: The resistance time (3.9) includes times of less than 5 s each for tool changes, e.g. exchanging a screwdriver for a crow bar.

[SOURCE: EN 1627:2021, 3.12 [1]]

3.10**safety**

pertaining to human health, in the context of enclosures, ensuring they are physically stable and cannot topple, have safety (3.10) glass that cannot be broken easily, do not generate atmospheres within them that are hazardous to health during usage or similar

3.11**security**

protection against theft and physical damage

prEN 15999-1:2023 (E)**3.12****showcase**

enclosure of any dimension for preserving and displaying objects in specified safe and secure conditions

Note 1 to entry: The term “display case” is sometimes used as a synonym

3.13**stakeholder**

individual, company or institution who is affected by the design, performance, purchase or use of a showcase (3.12) over its lifetime

3.14**support**

construction, material or device to hold and support one or more objects without interference or damage and designed to provide stability to an object

4 Principles and components of a showcase (3.12)**4.1 General**

The fundamental functions of showcases (3.12) are to:

- 1) display objects,
- 2) protect objects,
- 3) ensure preservation, to minimize damage to and deterioration of objects.

Showcases (3.12) display objects for visitors to interact with them and provide access to objects for staff members, while shielding against environmental and security (3.11) hazards. This document takes into account all uses of showcases (3.12): temporary showcase (3.12), showcase (3.12) without oxygen, oversized, existing, historical or modular showcase (3.12), showcase (3.12) in uncontrolled ambient environment, etc. This document applies to all stages of the life-cycle of a showcase (3.12) from concept design to recycling.

4.2 Components and materials of the showcase (3.12)**4.2.1 General**

A showcase (3.12) normally consists of:

- a) a display space (3.4) for objects,
- b) technical compartments,
- c) a base and / or mounting system,
- d) linings of the display space (3.4) and supports (3.14) for objects.

4.2.2 Display space

The display space (3.4) presenting the objects is surrounded by walls, of which at least one is transparent.

The dimensions of the display space (3.4) shall take into account the size of the object, its preservation and security (3.11) needs, supports (3.14) and mountings, accessibility by staff, viewing condition for visitors, and other exhibition elements such as panels and graphics, etc.

The contact between the door or opening panel and the showcase (3.12) maintains a seal that is appropriate to identified hazards.

The opening shall give sufficient access to the display space (3.4) for safe handling of the objects and for maintenance. The showcase (3.12) shall remain stable during opening and when it is fully opened.

The display space (3.4) provides room for installation of sensors/devices to monitor the microclimate (3.7) or other internal environmental or security (3.11) parameters and facilitates the collection of data.

4.2.3 Technical compartments

Technical compartments are publicly hidden parts of the showcase (3.12) where devices or materials for environmental control (e.g. lighting, microclimate (3.7), pollutants), and security (3.11) can be located.

A showcase (3.12) can contain one or more technical compartments.

Technical compartments containing sorbents for humidity or pollutant control shall connect with the display space (3.4) so they can take effect on objects. For this use of the technical compartment sufficient air exchange (3.1) with the display volume is essential and its installation adjacent to the display volume works best. Sufficient gaps for moisture exchange between the technical compartment and the display volume are essential to support the function of the moisture sorbent (3.8).

Technical compartments containing heat, vibration or pollutant generating components (e.g. lamps, fans) are to be avoided. If no other technical solution can be found, these compartments are isolated from the display space (3.4) so they do not transfer any hazards to objects. Air from these compartments is exchanged with the environment via vents. Heat generating components are best located in technical compartments above the display space (3.4).

Technical compartments shall be separately accessible for maintenance; without allowing access to the display space (3.4).

4.2.4 Installation and fixing of the showcase (3.12)

The base of the showcase (3.12) shall be strong and large enough to ensure the showcase (3.12) is physically stable so it cannot topple. If this is not possible, the showcase (3.12) shall be securely fixed to the floor, wall or ceiling. Alternatively, or in combination, the showcase (3.12) base shall be weighted with additional material to act as ballast.

If a mount is needed to fix the showcase (3.12), it shall take into account the weight of the showcase (3.12), its contents and the quality of the substrate (e.g. wall or floor).

The showcase (3.12) base, plinth or any other form of mount shall limit vibrations (5.9) transmitted into the display space (3.4) via associated walls, floor, or ceiling.

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4.2.5 Characteristics of construction materials

Contact with, or interaction between, objects and the materials of the showcase (3.12) shall be carefully considered. Not all materials are suitable for long-term use with objects.

The materials, and their off-gassing constituents, shall not react with objects. The materials used to construct the showcase (3.12), e.g. the structure, glazing, inserts, varnishes, sealants, adhesives, paints, textiles, etc. shall be selected on the basis of professionally recognized materials testing protocols (see prEN 15999-2:2023, Annex G) or less reliably, by checking available documentation (e.g. compliance certificates, technical data sheets).

4.2.6 Showcase (3.12) readiness for use

After the final construction and finishing of a showcase (3.12) adequate time shall be given to ensure proper curing and off-gassing to limit chemical pollution inside the display space (3.4) from materials used e.g. adhesives, sealants, coatings. A curing time reduces the risk of negative impact of volatiles air pollutants (3.3) inside the showcase (3.12) to the objects. This applies to showcases (3.12) completed off-site (e.g. in a factory) and on-site (e.g. in a museum)

NOTE Some materials can be sources of humidity (e.g. marble, concrete) which might also require some time to off-gas, i.e. to dry.

It is not recommended that objects shall be installed during this period in the showcase (3.12) without some precautions.

If material needs time to off-gas, the showcase (3.12) manufacturer shall indicate a recommended period; this recommendation can include advice for room temperature and ventilation. If no indication is given, a period of four weeks is suggested as a minimum. During the ventilation time the door shall be open and the environment where the showcase (3.12) is located should be well ventilated.

Additional measurement of air quality (see prEN 15999-2:2023, Annex G) in the showcase (3.12) is recommended before its use, depending on the sensitivity of the objects.

4.2.7 Lining of the display space (3.4) and object mounts

Linings and object mounts are not integral part of the showcase (3.12). Nevertheless, all linings and object mounts in the display space (3.4) should be tested to confirm their compatibility with the objects in the same way as the construction materials. The linings should be easy to maintain and/or replace.

The supports (3.14) shall maintain the physical integrity and chemical stability of the objects, without exerting undue pressure, tension or torque. The objects together with their support(s) (3.14) shall be stable. The system of fixing shall hold the objects safely even in case of vibrations.

The contact between the objects and the support(s) (3.14) shall be insulated with an intermediate material of appropriate density and texture.

4.3 Expected lifetime and maintenance cycle

The span of time in which a showcase (3.12) is fully functional defines its useful lifetime. When considering future expenditures on labour-time, consumables and repairs, there are ongoing economic and ecological costs to sustaining effective showcases (3.12). These future costs should be included as decision criteria when anticipating showcase (3.12) budgets: capital and operating.

The three categories of showcases (3.12) regarding life span are: temporary exhibition single use, temporary exhibitions repeated use and long-term exhibitions.

To achieve useful lifespans greater than approximately 5 years, two key aspects can be considered:

- 1) longevity of construction materials,
- 2) maintenance of the mechanical components (e.g. opening systems and gaskets) and extra mechanical, electrical and electronic features (e.g. lighting, active microclimate (3.7) system, filter, alarm and security (3.11) monitoring systems).

Maintenance of each component or feature needs to be undertaken following the guidance of its manufacturer.

Showcases (3.12) can be categorized according to their duration of use in long-term and temporary exhibitions. Temporary showcases (3.12) can be further divided between single-use and multiple-use.

- 1) Temporary showcases (3.12) – single use: The construction remains fully functional for the exhibition period, plus any likely extensions of the exhibition.
- 2) Temporary showcases (3.12) – multiple use: The construction remains fully functional for:
 - > 5 years
 - > 10 years
- 3) Long-term showcases (3.12): The construction remains fully functional during the planned span of the Gallery, potentially:
 - > 5 years
 - > 10 years
 - > 20 years
 - > 25 years

5 The showcase (3.12) role in the preventive conservation risk management plan

5.1 General

Objects on display are exposed to risks from damage by accidents, theft, vandalism and by environmental parameters such as humidity, temperature, pollutant (gaseous, particulate and direct contact between materials), dust (3.5), light and pests.

NOTE 1 Annex A lists potential events or circumstances which can have an effect on the showcase (3.12) design.

The showcase (3.12) plays a role in the risk management plan of an institution. It can assist with lowering risk-levels by reducing the likelihood of damage occurring to an object, and by reducing the

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severity of consequences when damage does occur. Some risks shall be controlled, while others might be judged as acceptable or tolerable.

If there are multiple risks to control, then solutions to mitigate the net risk or single greatest risk shall be implemented.

NOTE 2 Risk assessments by methods described in IEC 31010 [2] help to evaluate the magnitude of a risk.

The following paragraphs provide information on risks commonly identified by stakeholders (3.13) before a showcase (3.12) is designed.

5.2 Controlling risks of theft**5.2.1 General**

Risk assessment shall determine a suitable security (3.11) level for a showcase (3.12). The showcase (3.12) shall be an integrated part of the security (3.11) management of the entire premises. The role of the showcase (3.12) for securing the objects might depend on opening hours and closing hours of the exhibition.

The object value and the response time for building security (3.11), either current or projected, shall be considered in the risk assessment. A showcase (3.12) security (3.11) class shall be selected in correspondence to the security (3.11) requirements appraised by the risk assessment.

The operation of alarms and defence systems may be adjustable, depending on opening and closing hours and shall be integrated into the security (3.11) management of the entire premises.

5.2.2 Time of response

Knowing the time of response of security (3.11) personnel to an alarm, in order of magnitude (less than 5 min, 5-15 min, more than 15 min), is essential to estimate the degree of resistance required for the showcase (3.12).

The overall time of response can be estimated by considering the potential duration of all processes from the actual alarm to the intervention at the showcase (3.12). To prevent theft the resistance time (3.9) shall be longer than the overall time of response (see Formula 1 and Formula 2).

$$t_0 = t_1 + t_2 \quad (1)$$

$$t_R > t_0 \quad (2)$$

where

t_0 : overall time of response of security (3.11) personnel to an alarm, takes into account t_1 and t_2 ,

t_1 : detection and the transmission time (transmission by the security (3.11) staff or the electronic alarm system),

t_2 : intervention time, (arrival on security (3.11) staff, police officers, etc.) and if applicable, reaction (set up systems to block the escape of persons who have entered the premises,

t_R : overall resistance time (3.9), depending on the security (3.11) concept, the resistance times (3.9) for the perimeter, premises, building, room and showcase (3.12) shall be evaluated and accumulated

5.2.3 The object value

The object value can be classified in 3 categories taking into account the historical, symbolic and financial aspects:

- Inestimable, unique;
- large range of values, coveted on the market;
- non coveted.

5.2.4 Showcase (3.12) security (3.11) class recommendation

Table 1 presents the different scenarios for the value of the object/collection and the response time of the security (3.11) personnel and recommends showcase (3.12) security (3.11) levels (Showcase (3.12) class). For each scenario several solutions, showcase (3.12) classes, are suggested and the table provides the minimum level of security (3.11) to achieve for the showcase (3.12).

Table 1 — Different scenarios between the recommended showcase (3.12) security (3.11) level as defined in prEN 15999-2:2023, Annex A

Response time of security (3.11) personnel	Object(s) value					
	Inestimable		Large range of values		No coveted on the market	
	Recommended security (3.11) level	tolerable security (3.11) level	Recommended security (3.11) level	tolerable security (3.11) level	Recommended security (3.11) level	tolerable security (3.11) level
> 15 min	A or B	-	A or B	C	A, or B	C or D
< 5 to 15 min	A or B	C	A, B or C	D	A, B or C	D or E
< 5 min	A or B	C or D	A, B or C	D or E	A, B, C, D or E	-

With class A being the most resistant, up to class E, the less resistant.

5.3 Risk assessment fire

A risk assessment shall be carried out to evaluate the likelihood with which fire can break out on the premises and the rate in which fire could develop (fire growth and flame spread). Indication for the assessment can be found in the literature (see [3]).

The likelihood of fire can depend on:

- the existing cultural assets protection plan, the rapidity of intervention, the training of staff and safety (3.10) personnel,
- the building regulation on fire safety (3.10), fire systems (detection, alarm, extinguish measures),
- the building structure,