



# SLOVENSKI STANDARD

## SIST EN 16893:2018

01-april-2018

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**Ohranjanje kulturne dediščine - Specifikacije za lokacijo, gradnjo in spreminjanje stavb ali prostorov, namenjenih za shranjevanje ali uporabo zbirk kulturne dediščine**

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

Erhaltung des kulturellen Erbes - Neue Stätten und Gebäude für die Lagerung und Nutzung von Sammlungen

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Conservation du patrimoine culturel - Nouveaux sites et bâtiments destinés au stockage et à l'utilisation de collections

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**Ta slovenski standard je istoveten z: EN 16893:2018**

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**ICS:**

91.040.01	Stavbe na splošno	Buildings in general
97.195	Umetniški in obrtniški izdelki. Kulturne dobrine in kulturna dediščina	Items of art and handicrafts. Cultural property and heritage

**SIST EN 16893:2018**

**en,fr,de**

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EUROPEAN STANDARD

EN 16893

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2018

ICS 97.195

English Version

## Conservation of Cultural Heritage - Specifications for location, construction and modification of buildings or rooms intended for the storage or use of heritage collections

Conservation du patrimoine culturel - Spécifications pour l'emplacement, la construction et la modification des bâtiments et des salles destinés au stockage ou à l'utilisation de collections

Erhaltung des kulturellen Erbes - Festlegungen für Standort, Errichtung und Änderung von Gebäuden oder Räumlichkeiten für die Lagerung oder Nutzung von Sammlungen des kulturellen Erbes

This European Standard was approved by CEN on 20 November 2017.

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## Contents

	Page
European foreword.....	5
Introduction .....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions .....	7
4 Principles and strategies.....	11
4.1 Sustainability.....	11
4.2 Risk management.....	11
4.2.1 General.....	11
4.2.2 Hazards to collections .....	12
4.3 Environmental strategy.....	12
4.3.1 General.....	12
4.3.2 Collection information .....	12
4.3.3 Specifications for environmental protection.....	13
4.4 Environmental monitoring strategy .....	13
4.4.1 General.....	13
4.4.2 Methodology .....	13
4.5 Facilities management strategy.....	14
5 Building specifications.....	14
5.1 Building location .....	14
5.1.1 Hazards identification .....	14
5.1.2 Natural hazards .....	15
5.2 Site capacity .....	15
5.2.1 General.....	15
5.2.2 Self-containment .....	16
5.3 Building structure and environmental protection .....	16
5.3.1 General.....	16
5.3.2 Construction materials .....	16
5.3.3 Building acclimatization.....	16
5.3.4 Passive or low-energy environment structures.....	17
5.4 Air quality .....	18
5.4.1 General.....	18
5.4.2 External pollutants.....	18
5.4.3 Internal pollutants.....	19
5.4.4 Ventilation .....	20
5.5 Mechanical environmental control .....	20
5.5.1 General.....	20
5.5.2 Air conditioning for storage repositories .....	21
5.6 Prevention of infestation by pests and mould.....	21
5.7 Protection against water .....	22
5.7.1 Design and materials .....	22
5.7.2 Rainwater discharge systems .....	22
5.7.3 Drainage and piping work .....	22
5.8 Windows and lighting.....	23
5.8.1 General.....	23

5.8.2	Glazing and light levels.....	23
5.8.3	Artificial lighting.....	23
5.8.4	Lamps.....	23
5.9	Emergency electrical supply.....	24
5.10	Ceilings.....	24
5.11	Floors and load distribution.....	24
5.11.1	General.....	24
5.11.2	Calculation of floor loads.....	24
5.12	Storage space arrangements.....	24
6	Fire protection and prevention.....	25
6.1	General.....	25
6.2	Fire risk assessment.....	25
6.3	Structural fire protection.....	26
6.3.1	General.....	26
6.3.2	Structural fire resistance.....	26
6.3.3	Lightning conduction.....	26
6.3.4	Fire compartments.....	26
6.3.5	Doors and other openings.....	27
6.3.6	Vertical openings.....	27
6.3.7	Minimizing fire hazard in an electrical system.....	27
6.4	Minimizing fire hazards in ventilation plant and equipment.....	27
6.4.1	Ductwork.....	27
6.4.2	Dampers.....	27
6.5	Fire detection and firefighting.....	28
6.5.1	General.....	28
6.5.2	Detection and alarm systems.....	28
6.5.3	Monitoring.....	28
6.5.4	Automatic fire-fighting systems.....	28
6.5.5	Portable fire extinguishers.....	28
6.5.6	Protection of areas adjacent to collection spaces.....	29
6.5.7	Smoke extraction.....	29
6.5.8	Fire control and mobile shelves.....	29
7	Security specifications.....	29
7.1	General.....	29
7.2	Security risk assessment.....	29
7.3	Site security.....	29
7.4	Protection against intruders.....	29
7.5	Entrances.....	30
7.6	Services.....	30
7.7	Windows.....	30
7.8	External doors to the building.....	30
Annex A	(informative) Automatic fire-fighting systems.....	31
A.1	General.....	31
A.2	Combustible materials.....	31
A.3	Inert gas and chemical agent suppression systems.....	31
A.4	Overpressure.....	32
A.5	Reduced oxygen systems.....	32
A.6	Water-mist systems.....	32

**EN 16893:2018 (E)**

<b>Annex B (informative) Relative risk of damage and deterioration due to temperature .....</b>	<b>33</b>
<b>Annex C (informative) Relative risk of damage and deterioration due to relative humidity .....</b>	<b>36</b>
<b>Annex D (informative) Examples of internal pollutants and their sources .....</b>	<b>39</b>
<b>Annex E (informative) Light Sensitivity - Sensitivity of coloured materials to light.....</b>	<b>40</b>
<b>Annex F (informative) Recommended maximum loads.....</b>	<b>41</b>
<b>Bibliography.....</b>	<b>42</b>

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<https://standards.iteh.ai/catalog/standards/sist/d7eca7d4-8449-4ece-892c-53d05a96141f/sist-en-16893-2018>

## European foreword

This document (EN 16893:2018) 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 August 2018, and conflicting national standards shall be withdrawn at the latest by August 2018.

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

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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## Introduction

Cultural heritage collections are intended to be kept for future as well as current generations. Their long-term conservation can only be achieved if the sites and buildings that house them support this goal and do not place them at risk. Building features that are intended to protect collections are primarily structural, involving resilience against external and internal hazards including fire, water, pests, criminal activity and environments that interact with heritage materials.

Environmental considerations for collections are influenced by the nature of their materials, their condition and the uses to which they are put. They are also influenced by policies relating to conservation objectives, such as longevity of collections, and by the nature and costs of energy required to achieve these objectives.

This standard assists custodians of cultural heritage collections by defining the criteria and information necessary to make policy relating to conservation that will in turn influence the outcome of building construction. It is also intended to help them define the specifications necessary for the construction or modification of buildings such that they can safely house collections.

These specifications should be used by architects, engineers and others responsible for the design and construction of new archives, libraries and museums, or modifying spaces within existing buildings for these purposes.

These specifications might not be applicable in historic buildings which may also contain cultural heritage objects, e.g. churches.

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## 1 Scope

This European Standard gives specifications and guidance for the location, construction and arrangement of building specifically intended for internal storage of all heritage collection types and formats.

This standard applies to buildings where collections are housed permanently and can be used as guidance for shorter-term display spaces where appropriate. Throughout the document, where specifications relate exclusively to storage spaces, these are defined as such. Where specifications can also be applied to areas such as display galleries or reading rooms, these applications are referred to explicitly.

Clauses relating to risks associated with security, environmental hazards, fire, water and pests apply to buildings as a whole and to any room in which collections may be held.

Some of the clauses in this standard may be applicable in protected historic buildings that contain collections. In these settings, the scope for any alterations or achievement of conditions suitable for collections may be limited by the historic character of the structure, especially where it is protected by heritage regulations.

**NOTE** This standard covers the structure of buildings containing heritage collections, whether for storage or use. For a description of technical processing spaces recommended in the design specifically of a storage building open to the public, attention is drawn to EN 16141.

This standard should be seen as complementary to national or local building regulations and specifications.

## 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.

EN 1627, *Pedestrian doorsets, windows, curtain walling, grilles and shutters — Burglar resistance — Requirements and classification*

EN 1838, *Lighting applications — Emergency lighting*

EN 12056-3, *Gravity drainage systems inside buildings — Part 3: Roof drainage, layout and calculation*

CEN/TS 16163, *Conservation of Cultural Heritage — Guidelines and procedures for choosing appropriate lighting for indoor exhibitions*

EN 62305-2, *Protection against lightning — Part 2: Risk management (IEC 62305-2)*

EN 60332-1-1, *Tests on electric and optical fibre cables under fire conditions — Part 1-1: Test for vertical flame propagation for a single insulated wire or cable — Apparatus (IEC 60332-1-1)*

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

EN ISO 16890-1, *Air filters for general ventilation — Part 1: Technical specifications, requirements and classification system based upon particulate matter efficiency (ePM) (ISO 16890-1)*

## 3 Terms and definitions

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

**EN 16893:2018 (E)****3.1****air-conditioning**

mechanical system that maintains predetermined control of temperature, humidity, air quality and air distribution

**3.2****air infiltration**

uncontrolled leakage of air through unsealed points and permeable building materials into a building envelope

**3.3****aspirating smoke detector (ASD)**

smoke detector, in which air and aerosols are drawn through a sampling device and carried to one or more smoke sensing elements by an integral aspirator (e.g. fan or pump)

Note 1 to entry: Each smoke sensing element may contain more than one sensor exposed to the same smoke sample.

[SOURCE: EN 54-20:2006, 3.1, modified – abbreviation ASD has been added.]

**3.4****automatic fire-fighting system**

integrated system within a building, designed to control, suppress or extinguish a fire, activated by detection systems

Note 1 to entry: These units can be single- or double-sided.

**3.5****Building Management System (BMS)**

computer-based control system installed in buildings that controls and monitors the building's mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems, and security systems

**3.6****bund**

structural upstand that can contain water within a defined space in the event of a flood

**3.7****CCTV system**

system consisting of camera equipment and/or other image-capture devices, detector(s), monitoring and associated equipment for transmission and controlling purposes

**3.8****collection**

group of objects having shared or combined significance

Note 1 to entry: The term “collection” is mainly used within “movable cultural heritage”.

[SOURCE: EN 15898:2011, 3.1.4, modified – note to entry was shortened]

**3.9****conservation**

measures and actions aimed at safeguarding cultural heritage while respecting its significance, including its accessibility to present and future generations

Note 1 to entry: Conservation includes preventive conservation, remedial conservation and restoration.

Note 2 to entry: The term “conservation-restoration” is mainly used in the field of movable cultural heritage.

Note 3 to entry: The term “preservation” is also used, e.g. in libraries and archives.

Note 4 to entry: All conservation actions are based on documentary and/or material evidence.

[SOURCE: EN 15898:2011, 3.3.1]

### **3.10 cooling load**

power demand (measured in kilowatts) that is imposed upon an air-conditioning system in maintaining a room at the required level of temperature and RH

### **3.11 environment**

surroundings of an object, some aspects of which may affect its condition

Note 1 to entry: Such aspects could be of human, physical, chemical, biological or climatic origin.

[SOURCE: EN 15898:2011, 3.2.2]

### **3.12 environmental control**

management of one or more factors of the environment

Note 1 to entry: This applies to temperature, relative humidity, light, pollution, etc.

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[SOURCE: EN 15898:2011, 3.4.3]

### **3.13 fire resistance**

ability of a building component or construction to withstand the passage of flames and hot gases and temperature rise for a stated period, including load-bearing capacity, integrity and insulation

### **3.14 monitoring**

process of measuring, surveying and assessing the material properties of objects and/or factors of the environment over time

[SOURCE: EN 15898:2011, 3.4.4]

### **3.15 object**

single manifestation of tangible cultural heritage

Note 1 to entry: The term “object” is used in this standard for cultural heritage, both immovable and movable. In specific professional contexts, other terms are used: e.g. “artefact”, “cultural property”, “item”, “ensemble”, “site”, “building”, “fabric”.

[SOURCE: EN 15898:2011, 3.13]

**EN 16893:2018 (E)****3.16****pre-action sprinkler**

dry sprinkler system or one in dry mode in which the alarm valve can be opened by an independent fire detection system in the protected area

**3.17****preventive conservation**

measures and actions aimed at avoiding or minimizing future damage, deterioration and loss and, consequently, any invasive intervention

Note 1 to entry: In the field of movable heritage, “preventive conservation” is generally indirect; namely, these measures and actions are carried out within the immediate environment of the object.

[SOURCE: EN 15898:2011, 3.3.5]

**3.18****relative humidity (RH)**

ratio of the actual water vapour pressure to the saturation vapour pressure

[SOURCE: EN 15757:2010, 3.9]

**3.19****remedial conservation**

actions applied directly to an object to arrest deterioration and/or to limit damage

**3.20****risk assessment**

identification, analysis and evaluation of threats that might alter significance, and the probability of their occurrence

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Note 1 to entry: Risk assessment is part of the overall process of “risk management” [ISO Guide 73:2009, 3.1.7].

[SOURCE: EN 15898:2011, 3.4.5]

**3.21****sprinkler system**

system of water pipes fitted with sprinkler heads at set intervals and heights, designed to detect, control or extinguish a fire by the automatic discharge of water

**3.22****storage**

designated area where objects are housed providing the necessary conditions required for preservation, safety and security while not on display

Note 1 to entry: The term “repository” is used in archives and libraries.

[SOURCE: EN 16141:2012, 3.8]

**3.23** **$T_g$  – Glass transition temperature**

reversible transition in amorphous materials (or in amorphous regions within semicrystalline materials) from a hard and relatively brittle “glassy” state into a molten or rubber-like state, as the temperature is increased

Note 1 to entry: Examples of cultural heritage materials sensitive to temperatures that influence  $T_g$  include gelatine photographic emulsions and waxes.

### 3.24

#### UVA

ultraviolet radiation of wavelength 315 nm to 400 nm, which is present in sunlight and some artificial light and is damaging to many heritage collection materials

### 3.25

#### Whole Life Cost (WLC)

total cost of ownership over the life of an asset, in this context a building

Note 1 to entry: Typical costs include planning, design, construction, operation, maintenance, renewal, eventual demolition, build cost and depreciation.

## 4 Principles and strategies

### 4.1 Sustainability

As cultural heritage collections are intended to be preserved indefinitely, buildings intended to house them shall be designed to have a long life. Whether planning a new building or the refurbishment of an existing building, the Whole Life Cost (WLC) shall be evaluated and used as a basis for decision-making. The projected energy use, water consumption, carbon emissions and maintenance costs over the life of a building shall be included, in addition to capital costs.

Planning for any new or refurbished building or space shall be directed at determining whether collections can be protected through passive or low energy means wherever possible. Wherever a collection requires ongoing energy use (e.g. heating, freezer storage), the use of renewable energy sources should be explored in the first instance. Since the success or otherwise of a passive climate building design strategy over time may not be predictable at the planning stage, options for retro-fitting controls in the future shall be taken into account.

Consideration of a site shall also take account of the potential energy consumption of users travelling to the location. For example, a remote location may be low risk but it may increase energy consumption, so the balance of risk over ease of accessibility should be assessed.

Assessment of costs associated with construction shall comply with ISO 15686, Parts 1 and 5.

### 4.2 Risk management

#### 4.2.1 General

A risk assessment shall be carried out when deciding where to locate a new building or collection space intended to house cultural heritage collections, whether for storage, display or other use, as defined under Clause 5 below. Existing buildings or rooms housing collections shall be re-assessed against risks periodically, particularly when new hazards are known to have emerged. Information and data need to be gathered and assessed in order to formulate a policy for the intended environment, security, fire and flood protection inherent in the building design or its continued use. As part of the risk assessment, the methodology and steps below shall be included. The risks set out in the following clauses shall be considered when:

- a) planning and constructing the building or collection space (including risks associated with the construction works themselves, in an existing building),
- b) equipping the building, and
- c) managing the building once in use.

**EN 16893:2018 (E)****4.2.2 Hazards to collections**

The nature and use of the collections to be housed shall define requirements for the qualities and design of a building or room in which they are to be placed. The organization shall identify the hazards that affect its collections and assess the likelihood and impact of those hazards occurring. The following hazards are common to cultural heritage collections and shall be assessed:

- a) environment (internal and external): temperature, humidity, light and pollution including gaseous and particulate (see Annexes B to E for examples of guidance information regarding environmental risks and sensitivities of collection materials);
- b) bio deterioration (pests and mould);
- c) theft, robbery;
- d) vandalism;
- e) fires;
- f) water (fresh water supply and wastewater);
- g) natural events (torrential rain, flooding, landslide, earthquake, etc.).

The hazards associated with the location of a building shall be identified in accordance with 5.1. The location within a building of activities and services that may create a hazard, e.g. kitchens, laboratories, shall be taken into account in the risk assessment.

**4.3 Environmental strategy****4.3.1 General**

SIST EN 16893:2018

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An environmental management strategy for the collection shall be developed, based on an assessment of the needs of the collections. The strategy shall include a statement of the expected collection lifetime and the energy demand arising from the environmental conditions needed to achieve this, taking into account the sensitivity, significance and use of individual collection items.

The strategy shall make clear the balance the organization intends to aim for between conservation requirements, collection use and energy economy.

**4.3.2 Collection information**

As a minimum, the information relating to the collection shall include the following:

- a) the significance of the collection or collection items therein;
- b) the current and expected usage of the collection, including display, handling, transit and loan;
- c) the condition of the collection, its structure and component materials;
- d) the past environment of the collection and its sensitivity (to RH, temperature, light and pollutants) as detailed in any existing records, noting in particular changes over time (see also Annexes B to E);
- e) the expected growth and development of the collection.

### 4.3.3 Specifications for environmental protection

Any environmental specification has to be set with the aim of preserving the collection concerned. Environmental specifications shall be established after a review of:

- a) the preferred collection lifetime and associated energy demand;
- b) the risk assessment of environmental hazards conducted in 4.2.1 a);
- c) the information collected in 4.3.2;

The environmental specifications for collections shall include:

- 1) the permissible upper and lower limits for temperature and a desired seasonal average;
- 2) the permissible upper and lower limits for RH and a desired seasonal average;
- 3) the permissible upper limit for light exposure, upper limit for illuminance and upper limit for UV to light ratio if relevant;
- 4) pollutants expected to cause unacceptable risk;

NOTE See also 5.4.3.2.

Environmental specifications shall be set for general storage, cooled storage, cold storage, display and transit, as appropriate based on the collection type. Separate environmental specifications shall be set for any microclimates.

## 4.4 Environmental monitoring strategy

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**4.4.1 General** <https://standards.iteh.ai/catalog/standards/sist/d7eca7d4-8449-4ece-892c-53d05a96141f/sist-en-16893-2018>

An understanding of how well a collection will be protected and preserved can only be achieved by continuous monitoring of the environment in which material is held. All spaces intended for future installation of collections shall be monitored before installation in order to understand how the spaces behave and how they may need to be modified. Monitoring shall also be carried out in existing locations that already hold collections, in order to understand the present state of the collections, particularly if they are to be moved to a new location. The information derived from monitoring shall be reviewed regularly and the implications of trends in RH, temperature, light and, where necessary, atmospheric pollutants shall be interpreted by a conservator or other specialist with knowledge of the collection and the building and its infrastructure. Monitoring alone does nothing to improve preservation conditions; it is essential to respond to evidence from monitoring that shows conditions are or will be outside recommended ranges and to rectify the situation or plan for improvements.

### 4.4.2 Methodology

Monitoring devices for environmental hazards shall be provided and used within collection space, whatever the method of environmental control. Monitoring of temperature and RH should typically be carried out continuously (e.g. a minimum of 1 datum per hour). Even if a building management system (BMS) is in use, independent monitoring devices shall be used to verify its correct operation. Monitors and their sensors shall be situated to provide readings that represent the typical conditions in which collections are held or will be held but account should also be taken of extreme or abnormal conditions that could occur, for example near outside walls or close to a source of heating or ventilation. For comparative purposes, the outdoor temperature and RH shall be monitored and pollutants where necessary.