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Bevarande av kulturarv – Specifikationer för styrning av inomhusklimat – Del 1: Riktlinjer för uppvärmning av kyrkor, kapell och andra platser av sakral betydelse

Conservation of cultural property – Indoor climate – Part 1: Guidelines for heating churches, chapels and other places of worship



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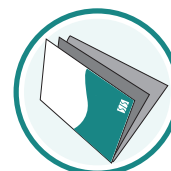
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EUROPEAN STANDARD

EN 15759-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2011

ICS 97.195

English Version

**Conservation of cultural property - Indoor climate - Part 1:
Guidelines for heating churches, chapels and other places of
worship**

Conservation des biens culturels - Environnement intérieur
- Partie 1 : Recommandations pour le chauffage des
églises, chapelles et autres édifices cultuels

Erhaltung des kulturellen Erbes - Raumklima - Teil 1:
Leitfäden für die Beheizung von Andachtsstätten

This European Standard was approved by CEN on 8 October 2011.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 15759-1:2011) has been prepared by Technical Committee CEN/TC 346 "Conservation of cultural property", 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of an identical text or by endorsement, at the latest by May 2012, and conflicting national standards shall be withdrawn at the latest by May 2012.

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

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Introduction

Churches, chapels and other places of worship such as mosques and synagogues (referred to collectively in the text of this standard as “places of worship”) are an important part of European cultural heritage. The buildings and their interiors, containing cultural heritage objects, are documents of our heritage that society agrees need to be preserved for present and future generations. The indoor climate is a critical factor in conserving the fabric of buildings and the objects they house.

This European Standard is motivated by the need to reflect the special characteristics of places of worship, conditions which are not addressed in standards for the heating of other kinds of buildings. The defining characteristics of these buildings are their construction (often early building techniques); the fact that they were not designed as living or working spaces; their intermittent use; and the vulnerability of their surface decoration and contents. Originally, most historic places of worship had little or no heating. Nowadays, buildings in cold climate regions may be heated in order to:

- a) provide thermal comfort for worshippers, staff and visitors (referred collectively in this text as “users”);
- b) improve the indoor climate conditions for the conservation of the building and its contents;
- c) achieve a combination of (a) and (b) in buildings where both conservation and thermal comfort have to be considered.

The conventional climate requirements for thermal comfort can sometimes be in conflict with the requirements for conservation and may therefore call for compromise.

A decision on changing or replacing the heating system in a place of worship generally depends on a variety of factors: the pattern of use of the building (e.g. frequency, numbers of users, opening hours for visitors), its liturgical uses, the significance, condition, and vulnerability of the building and its often valuable contents, thermal comfort of the users, costs (installation, operation and maintenance), energy efficiency and sustainability, visual and audible impact, aesthetics, impact on the building structure, safety, and national laws and regulations.

This standard provides guidelines in order to facilitate the best possible decision on behalf of the end users. The standard is divided into the following steps:

- a) assessment of the building, its interior and contents;
- b) determine an indoor climate specification with respect to conservation and thermal comfort;
- c) determine an appropriate heating strategy;
- d) select and design an appropriate heating system;
- e) implement the proposed changes;
- f) evaluate the effectiveness of the heating system with respect to the specification.

This is the first standard in a series of standards on indoor climate and climate control in cultural heritage buildings. The air exchange of a building has a fundamental influence on its indoor climate and climate control; general considerations are given in Clause 5. Ventilation will be dealt with fully in the second part of the series of standards on indoor climate in cultural heritage buildings, prEN 15759-2, *Conservation of cultural property — Indoor climate — Part 2: Ventilation*.

1 Scope

This European Standard provides guidelines for the selection of heating strategies and heating systems in churches, chapels and other places of worship such as mosques and synagogues, in order to prevent damage to cultural property while at the same time creating an indoor climate that allows for a sustainable use of these buildings. It applies to most kinds of places of worship regardless of size and construction. This European Standard applies not only to the introduction of new heating systems but also to the replacement of old ones.

This European Standard applies to buildings that are part of cultural heritage or that house cultural heritage objects. This European Standard deals with indoor climate conditions, heating strategies and technical solutions for their implementation but not with the technical equipment itself.

2 Normative references

The following referenced documents are indispensable for the application 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 15757, *Conservation of Cultural Property — Specifications for temperature and relative humidity to limit climate-induced mechanical damage in organic hygroscopic materials*

EN 15758, *Conservation of Cultural Property — Procedures and instruments for measuring temperatures of the air and the surfaces of objects*

prEN 16095¹⁾, *Conservation of cultural property — Condition report of movable heritage — Visual inspection and description of the condition of movable heritage*

prEN 16096¹⁾, *Conservation of cultural property — Condition survey of immovable heritage*

prEN 16242¹⁾, *Conservation of cultural property — Procedures and instruments for measuring humidity in the air and moisture exchanges between air and cultural property*

EN ISO 7730, *Ergonomics of the thermal environment — Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria (ISO 7730:2005)*

EN ISO 11079:2007, *Ergonomics of the thermal environment — Determination and interpretation of cold stress when using required clothing insulation (IREQ) and local cooling effects (ISO 11079:2007)*

3 Terms and definitions

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

**3.1
climate**
statistics of temperature, humidity, atmospheric pressure, wind, rainfall, and other meteorological elements in a given location over a long period of time

**3.2
preservation heating**
heating used to improve the indoor climate for conservation purposes

1) Under publication.

3.3**continuous heating**

permanent heating of a building throughout the cold period of the year

3.4**cultural heritage**

tangible and intangible entities of significance to present and future generations

3.5**dew point**

temperature to which humid air must be cooled for water vapour to condense into liquid water

3.6**general heating**

heating of the whole building volume

3.7**historic climate**

description of the climate over a representative period of time

3.8**indoor climate**

climate inside a room or a building

3.9**intermittent heating**

heating of a building operated for limited periods of time

3.10**local heating**

heating a limited space in the building

3.11**microclimate**

climate in part of a building or a room where the climate differs from the surrounding climate

3.12**mixed mode heating**

combination of continuous and intermittent heating, where the building is continually kept at a low temperature and heated to a higher temperature only when it is used

3.13**natural indoor climate**

indoor climate of a building without heating, forced ventilation or any other kind of active climate control

3.14**outdoor climate**

climate outside of a building

3.15**target range of RH variations**

range of RH variations that must be maintained to avoid climate induced damages

3.16**thermal comfort**

state of mind that expresses satisfaction with the surrounding environment

3.17**thermal stratification**

vertical layering of air temperatures in a building