

Conservation of cultural property - Procedures and instruments for measuring temperatures of the air and of the surfaces of objects

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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English Version

Conservation of Cultural Property - Procedures and instruments for measuring temperatures of the air and the surfaces of objects

Conservation des biens culturels - Méthodes et instruments
de mesure de la température de l'air et de la surface des
objets

Erhaltung des kulturellen Erbes - Verfahren und Geräte zur
Messung der Temperatur der Luft und der Oberflächen von
Gegenständen

This European Standard was approved by CEN on 23 July 2010.

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Foreword

This document (EN 15758:2010) 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of an identical text or by endorsement, at the latest by March 2011, and conflicting national standards shall be withdrawn at the latest by March 2011.

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

This standard is intended to assist in providing an acceptable environment for tangible cultural heritage. The temperature of the air and of object surfaces constitute important aspects of that environment. Temperature is one of the factors which can have a profound effect on the preservation of objects. Physical characteristics of materials change as they absorb or release heat. Objects expand and contract as the temperature changes, become rigid and brittle if the temperature falls below the glass transition temperature, or are mechanically damaged by the melting and freezing of water. The rates of some important chemical reactions, such as the degradation of cellulose (paper, textiles) increase with rising temperature. Temperature influences the activity of fungi and insects responsible for the bio-deterioration of organic materials. Temperature may affect some minerals and masonry crystallisation. Temperature also has an important indirect effect: a rise in temperature causes lowering of the relative humidity, which results in the drying of moisture absorbing materials such as wood, paper or leather. Such drying may lead to shrinkage and embrittlement. When direct radiation from sun, lamps or radiant heaters reaches objects, the consequent temperature rise causes drying even when the relative humidity of the surrounding air remains constant. Whatever the air temperature, the water vapour may condense on cold surfaces if their temperature drops below the dew point.

The control of levels and variability of temperature contributes to a proper environment for cultural property and thereby reduces the risk of deterioration. Such control is an important preventive measure which will minimise the need for future conservation interventions.

This standard recommends procedures for measuring the temperature of the air and of the surfaces of cultural property in indoor and outdoor environments as well as specifying the minimum characteristics of instrument for such measurements. Although standards exist for measuring the air or surface temperature in other fields like meteorology, industry or medicine, this standard focuses on the specific requirements of cultural property. One of the main concerns has been the use of non-contact or remote methods to make possible measuring temperatures of fragile and precious surfaces without any physical contact. However, taking measurements of the object surface, whether using contact or non-contact methods, involves a degree of risk to the object and should not be undertaken without clear justification nor without consultation with a suitably qualified and experienced conservator, preferably as part of an interdisciplinary team.

This document is one of the series of European Standards intended for use in the study of environments of cultural property.

Any measuring system which meets or exceeds the requirements of this European Standard can be used. The description or listing of certain instruments signifies only that they are recommended. It is up to users to analyze the quality of instruments available on the market and verify whether they conform to this document.

1 Scope

This European Standard recommends the procedures for measuring the temperature of the air and of the surfaces of cultural property in indoor and outdoor environments, as well as specifying the minimum characteristics of instruments for such measurements.

This document contains recommendations for accurate measurements to ensure the safety of objects and it is addressed to any people with the responsibility of the environment, its diagnosis, the conservation or maintenance of buildings, collections, or single object.

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 ISO 7726:2001, *Ergonomics of the thermal environment — Instruments for measuring physical quantities (ISO 7726:1998)*

3 Terms and definitions

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

3.1

air temperature

T

temperature read on a thermometer which is exposed to air in a position sheltered from direct solar radiation or other energy sources

NOTE This is expressed in degrees Celsius (°C).

3.2

black-globe thermometer

thermometer consisting of a black globe in the centre of which is placed a temperature sensor, and which records the effective air-radiant temperature which results from a thermal balance between air temperature, radiation coming from the different heat sources and convective motions

3.3

blackbody strip target

low thermal inertia, blackbody target, like a strip of black textile, which assumes an effective air-radiant temperature resulting from a thermal balance between air temperature, radiation coming from light, heat sources and convective motions

NOTE The surface temperature of the blackbody target is then measured with a quasi-contact or a remote thermometer.

3.4

blackbody

body which absorbs all the ultraviolet, visible and infrared radiation impinging on it, i.e. having surface emissivity 1

3.5

contact sensor

sensor placed in direct physical contact with the surface and devised to reach thermal equilibrium with it