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Information and documentation — Management of the environmental conditions for archive and library collections

Information et documentation — Gestion des conditions environnementales pour les documents d'archive et de bibliothèque

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 46, *Information and documentation*, Subcommittee SC 10, *Requirements for document storage and conditions for preservation*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This document covers much of the same ground as BSI/PAS 198[46]. The main difference is that BSI/PAS 198 was designed to be applied in British conditions with a temperate climate. Challenges vary in different climatic zones. Nevertheless, there are principles that are generally applicable.

No one set of conditions is appropriate for all collections in all circumstances because environmental specifications are tailored to the needs of a specific collection, the resources of the institution and the context within which it operates, and the local climate. This document sets out a framework for decision making relating to appropriate environmental conditions for cultural collections in the specific climatic zones.

Since archives, libraries and cultural institutions are guardians of the collective memory, their aim is to preserve material in the long term. They also have a duty to do so in a manner that minimizes the impact on the world's resources and climate. Climate change will affect cultural institutions as much as any other institution, if not more, and the use of energy, particularly from non-renewable sources, should be minimized. Wherever possible, passive (non-energy consuming) solutions are preferred, and buildings should be designed with this aim in mind.

First, the extent and composition of the collections, their significance, their current condition, the ways in which they are used, and the desired lifetime should be taken into account. For example, archive and library collections are likely to contain (in addition to bound and unbound paper and parchment and other organic materials, such as Xuan paper and silk, black and white and colour photographic prints and negatives) gramophone records, tapes and films, and, increasingly, diverse electronic media. In addition, the collections can contain all manner of artefacts in various materials. While many of these materials have similar environmental sensitivities, some have specific requirements that need to be taken into account.

The environment in which the collections are stored, used or displayed, and the resulting risks to them should also be understood. On the basis of the information gathered about the collections, regarding the nature and condition of the collections, it is possible to assess the vulnerability to factors such as temperature, relative humidity, light and pollutants, and thus what steps need to be taken to mitigate those risks. These might include the design of, or modifications to buildings, passive measures to control the environment, or improvements to storage and display techniques.

Every collecting institution can and should be able to carry out these steps, no matter how limited their resources, and irrespective of their climate. Knowledge of the collections, and of the risks, is indispensable to proper management and long term survival of the collections.

The consensus amongst conservation professionals regarding environmental parameters for exhibitions and loans is evolving rapidly. References [29], [206] and [236] give additional information on this. Although there is no doubt that a controlled environment is significant in the preservation of collections, provided that the parameters are appropriate to the materials, it is now generally accepted that daily and seasonal variations in temperature and relative humidity will not cause harm to the majority of collections.

This document also provides access to research that led to some of the changes in ISO 11799.

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Information and documentation — Management of the environmental conditions for archive and library collections

1 Scope

This document provides information on recent discussions and changes in recommendations and guidance on environmental management within the cultural heritage field. Conservation research on preventive methodologies and passive control provided by specific construction methods and renovations, developments in technology for controlling the environment, and energy and climate change issues are included.

This document is intended for archives and libraries and other institutions with large volumes of collections that are based on paper. Archives and libraries also have collections that include film, magnetic media, leather, and other organic, inorganic or composite materials. These institutions have a unique challenge of extending the lifespan of these materials for access and use in the present and for future generations. The environment plays a key role in extending the lifespan of all of these materials.

This document is intended for use in preservation planning and ongoing environmental management of permanent storage conditions for archives and library collections and applies to all collections being permanently stored for an institution.

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 terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
air change rate
air flow rate to a space, expressed as volume per unit time, divided by the volume of the space in consistent units

Note 1 to entry: Air change rate is often expressed as air changes per hour.

Note 2 to entry: This term is used where there is active ventilation [see also *ventilation rate* (3.40)].

[SOURCE: ISO 16814:2008, 3.5]

3.2
thermal stratification
tendency of heated air to rise and to arrange itself in layers with the warmest air at the top

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3.3
collection
holding
type of documents kept in archives and libraries regardless of their physical format

Note 1 to entry: These are mainly books, manuscripts, files, maps, graphic collections and other documents consisting of paper, but also parchment, papyrus, films, photographic materials, audio-visual recordings, magnetic and optical media, as well as bindings and protective material.

Note 2 to entry: Holdings is a term used more often in archival institutions.

3.4
dew point
measure of atmospheric moisture

Note 1 to entry: It is the temperature at which the water vapour in the air becomes saturated and condensation begins.

3.5
document
recorded information or material object which can be treated as a unit in a documentation process

3.6
effectiveness
extent to which planned activities are realized and planned results are achieved

3.7
energy
electricity, fuels, steam, heat, compressed air, and other like media

Note 1 to entry: For the purposes of this document, energy refers to the various forms of energy, including renewable, which can be purchased, stored, treated, used in equipment or in a process, or recovered.

Note 2 to entry: Energy can be defined as the capacity of a system to produce external activity or perform work.

[SOURCE: ISO 50001:2011, 3.5]

3.8
energy economy
careful management of energy resources

Note 1 to entry: This focuses on appropriate minimal consumption of energy within an institution, and incorporates both knowledge of energy performance and specific *energy efficiency* (3.9) of a building and/or mechanical systems.

3.9
energy efficiency
measures that ensure the building and system function in accordance with the design parameters by the efficient use of energy

[SOURCE: ISO 16813:2006, 3.17]

3.10
energy performance
measurable results related to *energy efficiency* (3.9), energy use and energy consumption

Note 1 to entry: In the context of *energy management systems* (3.12), results can be measured against the organization's energy policy, objectives, targets and other energy performance requirements.

[SOURCE: ISO 50001:2011, 3.12]

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3.11
environment
surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans and their interrelationships

Note 1 to entry: Surroundings can extend from within an organization to the local, regional and global system.

Note 2 to entry: Surroundings can be described in terms of biodiversity, ecosystems, climate or other characteristics.

[SOURCE: ISO 14001:2015, 3.2.1]

3.12
environmental management system
part of the management system used to manage environmental aspects, fulfil compliance obligations, and address risks and opportunities

[SOURCE: ISO 14001:2015, 3.1.2]

3.13
environmental performance
performance related to the management of environmental aspects

Note 1 to entry: For an *environmental management system* (3.12), results can be measured against the organization's *environmental policy* (3.14), environmental objectives or other criteria, using indicators.

[SOURCE: ISO 14001:2015, 3.4.11]

3.14
environmental policy
intentions and direction of an organization related to environmental performance formally expressed by its top management

[SOURCE: ISO 14001:2015, 3.1.3]

3.15
glass transition
reversible change in an amorphous polymer or in amorphous regions of a partially crystalline polymer from (or to) a viscous or rubbery condition to (or from) a hard and relatively brittle one

[SOURCE: ISO 11357-2:2013, 3.1]

3.16
glass transition temperature
T_g
characteristic value of the temperature range over which the glass transition takes place

Note 1 to entry: The assigned glass transition temperature ($_g$) may vary, depending on the specific property and on the method and conditions selected to measure it.

[SOURCE: ISO 11357-2:2013, 3.2]

3.17
HVAC system
system that provides heating, ventilation or air conditioning for buildings

[SOURCE: ISO 16814:2008, 3.18]

3.18
hydrolyse
chemical decomposition in which a compound is split into other compounds by reacting with water

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3.19
indicator
measurable representation of the condition or status of operations, management or conditions

[SOURCE: ISO 14031:2013, 3.15]

3.20
infiltration air
uncontrolled passage of air into a space through leakage paths in the building envelope

[SOURCE: ISO 16814:2008, 3.20]

3.21
insulation
materials that conduct heat poorly and thereby slow down heat loss from an object or space

3.22
long term storage
storage, for a period of undefined length, of material kept for permanent retention

3.23
maintenance
actions of prevention or correction to support long term functionality of repositories and the systems that support them

Note 1 to entry: Corrective action is taken to prevent recurrence whereas preventive action is taken to prevent occurrence.

3.24
management system
set of interrelated or interacting elements of an organization to establish policies and objectives and processes to achieve those objectives

Note 1 to entry: A management system can address a single discipline or several disciplines (e.g. quality, environment, occupational health and safety, energy, financial management).

Note 2 to entry: The system elements include the organization's structure, roles and responsibilities, planning and operation, performance evaluation and improvement.

Note 3 to entry: The scope of a management system can include the whole of the organization, specific and identified functions of the organization, specific and identified sections of the organization, or one or more functions across a group of organizations.

[SOURCE: ISO 14001:2015, 3.1.1]

3.25
mechanical ventilation
ventilation provided by mechanically powered equipment

[SOURCE: ISO 16814:2008, 3.22]

3.26
monitoring
determining the status of a system, a process or an activity

Note 1 to entry: To determine the status, there might be a need to check, supervise or critically observe.

[SOURCE: ISO 14001:2015, 3.4.8]

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3.27
natural ventilation
ventilation through leakage paths (infiltration) and intentional openings (ventilation) in the building envelope or room enclosure, which relies on pressure differences without the aid of powered air-moving components

[SOURCE: ISO 16814:2008, 3.24]

3.28
occupied zone
area designed for occupancy that is dependent on the geometry and the use of the room and specified case by case

Note 1 to entry: Usually used only for areas designed for human occupancy and defined as a volume of air that is confined by horizontal and vertical planes. The vertical planes are usually parallel with the walls of the room.

[SOURCE: ISO 16814:2008, 3.28]

3.29
outdoor air
air entering the system, or opening from outdoors before any air treatment

[SOURCE: ISO 16814:2008, 3.31]

3.30
outdoor air intake
opening through which outdoor air is admitted

[SOURCE: ISO 16814:2008, 3.30]

3.31
performance
measurable result

Note 1 to entry: Performance can relate either to quantitative or qualitative findings.

Note 2 to entry: Performance can relate to the management of activities, processes, products (including services), systems or organizations.

[SOURCE: ISO 14001:2015, 3.4.10]

3.32
process
set of interrelated or interacting activities which transforms inputs into outputs

Note 1 to entry: A process can be documented or not.

[SOURCE: ISO 14001:2015, 3.3.5]

3.33
relative humidity
RH
mass of water vapour in the air by volume divided by mass of water vapour by volume at saturation at the same temperature

[SOURCE: ISO 16814:2008, 3.34]

3.34
repository
building or room designed or arranged and used specifically and exclusively for long term storage of archive or library material

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3.35
requirement
need or expectation that is stated, generally implied or obligatory

Note 1 to entry: "Generally implied" means that it is custom or common practice for the organization and interested parties that the need or expectation under consideration is implied.

Note 2 to entry: A specified requirement is one that is stated, for example in documented information.

Note 3 to entry: Requirements other than legal requirements become obligatory when the organization decides to comply with them.

[SOURCE: ISO 14001:2015, 3.2.8]

3.36
sub-cool
process of cooling air below its initial dew point temperature to dehumidify via condensation

Note 1 to entry: The condensation dehumidification is followed by a reheat stage to manage temperature and relative humidity.

3.37
sustainability
maintenance of ecosystem components and functions for future generations, to address economic efficiency, social issues and environmental preservation

[SOURCE: ISO 16813:2006, 3.27]

3.38
systems
processes undergoing assessment

Note 1 to entry: Examples include heating, cooling, domestic hot water, lighting, ventilation and relevant automation or control.

[SOURCE: ISO 23045:2008, 3.3]

3.39
ventilation
process of supplying or removing air by natural means or mechanical means to or from a space for the purpose of controlling air contaminant levels, humidity, odours or temperature within the space

[SOURCE: ISO 16814:2008, 3.44]

3.40
ventilation rate
airflow rate at which outdoor air enters a building or enclosed space

[SOURCE: ISO 16814:2008, 3.45]

4 General

To manage the environment in an archive or library, objectives for planning and decisions should be determined. It should be determined what purpose environmental management will serve in meeting the preservation needs of the collections. Environmental management is often the major form of preservation action that can be carried out for all collections to prevent or slow down the deterioration of the most common materials found in archive and library collections. Determining the expected lifespan for the collections will help to determine limits to exposure to high temperature and high relative humidity and the priority within the collections for maintaining the best environment possible. To do this appropriately, the knowledge of the collections and the specific vulnerabilities of materials and formats is vital.

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