

BS 4971:2017



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Conservation and care of archive and library collections

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Summary of pages

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Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 June 2017. It was prepared by Subcommittee IDT/2/9, *Document preservation*, under the authority of Technical Committee IDT/2, *Information and documentation*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

Together with BS EN 16893¹, this British Standard supersedes BS 4971:2002 and PD 5454:2012, which will be withdrawn upon the publication of BS EN 16893.

Use of this document

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

Relationship with other publications

BS 4971:2017 contains archive and library specifications ([Clause 5](#)), hitherto covered by PD 5454, but which are considered out of scope of its replacement, BS EN 16893, being archive-specific. This means environmental parameters and decision-making for archive or library collections are covered by this British Standard and not by BS EN 16893.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is “should”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

The word “should” is used to express recommendations of this standard. The word “may” is used in the text to express permissibility, e.g. as an alternative to the primary recommendation of the clause. The word “can” is used to express possibility, e.g. a consequence of an action or an event.

Notes and commentaries are provided throughout the text of this standard. Notes give references and additional information that are important but do not form part of the recommendations. Commentaries give background information.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

¹ In preparation.

Introduction

Managing archive and library collections to ensure their long-term availability involves a specific range of activities known as conservation or collection care. This British Standard has been revised to reflect the current needs of the sector and is aimed at custodians and conservation specialists alike. It sets out a structured approach to defining conservation policy, identifying the needs of collections and prioritizing actions that will ensure their protection.

One of the challenges for modern archive and library management is the need to address a growing range of collection materials. Some materials exist in traditional, often stable forms, others are inherently unstable and short-lived. These latter include electronic formats that present new and complex challenges. This British Standard gives recommendations for the conservation of traditional media, more recent non-traditional media (such as photographic and analogue audio-visual media) and for the carriers of digital media. It does not include the preservation of digital information and associated metadata.

This British Standard has been developed with the acknowledgment that conservation is an overarching function, required to ensure that risks to collections are addressed, removed, mitigated or accepted. The deterioration rate of archive and library materials can be managed and to a certain extent controlled by the actions of custodians and conservators. In order to preserve a varied and challenging group of materials, a comprehensive knowledge of their composition and structural qualities is required.

An analysis of the needs of material types in the collection, and the provision of appropriate and sustainable storage and handling environments, constitute preventative conservation and are fundamental to any conservation strategy. Where remedial conservation measures are deemed necessary, to protect and provide access to vulnerable materials, it is important these measures are planned and managed in an informed and transparent manner. Having formerly been a document dealing exclusively with materials and practice, this British Standard now aims to assist custodians and conservators to work closely together to define their objectives, agree priorities and systematically plan their conservation activities.

1 Scope

This British Standard gives recommendations for the long term conservation of archive and library collections. It gives recommendations for managing conservation of collections, starting with organizational policy, strategy and planning, which in turn lead to the identification of prioritized actions and on-going processes that protect collections, such as environmental qualities, repository management and preventive and remedial treatment projects.

It is applicable to traditional archive and library collections, e.g. documents, books, maps, drawings, prints, photographic materials and the carriers of machine readable records in both analogue and digital format such as video cassettes and CDs.

It does not include the preservation of digital information and associated metadata.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions 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.

BS 1153, *Recommendations for processing and storage of silver-gelatin-type microfilm*

- BS 5699-1 (ISO 4331), *Processed photographic film for archival records — Specifications for silver-gelatin type on cellulose ester base*
- BS 5699-2 (ISO 4332), *Processed photographic film for archival records — Specifications for silver-gelatin type on poly(ethylene terephthalate) base*
- BS EN 356, *Glass in building — Security glazing — Testing and classification of resistance against manual attack*
- BS EN 15095, *Power-operated mobile racking and shelving, carousels and storage lifts — Safety requirements*
- BS EN 16095, *Conservation of cultural property — Condition recording for moveable cultural heritage*
- BS EN 16790, *Conservation of cultural heritage — Integrated pest management (IPM) for protection of cultural heritage*
- BS EN 16893², *Conservation of cultural heritage — Specifications for location, construction and modification of buildings or rooms intended for the storage or use of heritage collections*
- BS EN ISO 534, *Paper and board — Determination of thickness, density and specific volume*
- BS EN ISO 9706, *Information and documentation — Paper for documents — Requirements for permanence*
- BS ISO 302, *Pulps — Determination of Kappa number*
- BS ISO 10716, *Paper and board — Determination of alkali reserve*
- BS ISO 12606:1997, *Cinematography — Care and preservation of magnetic audio recordings for motion-pictures and television*
- BS ISO 18902, *Imaging materials — Processed imaging materials — Albums, framing and storage materials*
- BS ISO 18906, *Imaging materials — Photographic films — Specifications for safety films*
- BS ISO 18916, *Imaging materials — Processed imaging materials — Photographic activity test for enclosure materials*

3 Terms and definitions

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

3.1 collecting body

organization, institution, authority, trust or individual that collects archive and library material intended for long term preservation

3.2 conservation

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

NOTE Conservation can be sub-divided into preventive and remedial conservation (see [3.2.1](#) and [3.2.2](#)).

3.2.1 preventive conservation

indirect measures and/or actions aimed at avoiding and minimizing future deterioration, damage and/or loss

² In preparation.

3.2.2 remedial conservation

actions applied to an object to prevent or arrest damaging processes

NOTE Remedial conservation is also known as interventive conservation.

3.3 drop-spine box

single-piece book box with its lid and spine-wall hinged at the base allowing access to the bound volume from the spine side

NOTE A drop-spine box can also be used for the storage of paper manuscripts/documents.

3.4 aisle

subsidiary passageway between runs of shelf bays leading from a gangway enabling access to shelves for the removal or replacement of objects

3.5 archive

collection of archive and library material intended for long-term preservation

NOTE In this context 'archive' does not refer to the institution carrying out archiving activities.

3.6 archive and library material

object(s) found in library and archive collections

3.7 traditional material

paper, leather, cloth, parchment, wax and resin, palm leaves, birch bark, papyrus and their associated media

3.8 non-traditional material

plastics, photographic, audio-visual and electronic media and their carriers

NOTE Examples include negatives and transparencies, cine film, video and audio tape and cassettes, magnetic and optical discs etc.

3.9 unstable material

object(s) composed of materials that are rapidly deteriorating or becoming unusable

NOTE 1 Unstable material can be both traditional and non-traditional.

NOTE 2 Typically unstable materials include those which are decaying or which are becoming inaccessible through mechanical or digital obsolescence, such as 19th-20th century chemically reduced and wood pulp papers (e.g. newsprint), acid tanned leather, esterified plastics (e.g. negatives, cine film), magnetic emulsions and cassetted electronic media (e.g. video, optical discs) and chemically unstable inks.

NOTE 3 Further information about the characteristics of archive and library materials can be found in [Annex A](#) and [Annex B](#).

3.10 alkaline buffer

content of a packaging material, which reacts with volatile acids to protect the contents of the package

3.11 integrity

extent of physical or conceptual wholeness of an object

3.12 medium

material of which information is composed

NOTE Examples include inks, pigments, watercolours, etc.

3.13 substrate

surface upon which information is recorded

3.14 membrane

single skin, or part of a skin, of parchment or vellum

3.15 object

single manifestation of tangible cultural heritage

NOTE The term “object” is used in this standard as being the carrier of information such as manuscripts, printed matter, volumes, maps, drawings, photographic media and electronic records (both analogue and digital).

3.16 preservation

retention and protection of different formats of archive and library materials and/or their information content in order to maximize their useful life

NOTE For example, the reformatting of digital media.

3.17 repository

building, part of a building, or area(s) within a building designated for the long-term storage of collections

NOTE The term repository is not intended to embrace other associated functions such as reading rooms and offices within the same building.

3.18 run

two or more connected bays of single-sided or double-sided shelving joined end-to-end

NOTE See [Figure 1](#).

3.19 shelving compartment

shelf space for storing archival materials

NOTE See [Figure 1](#).

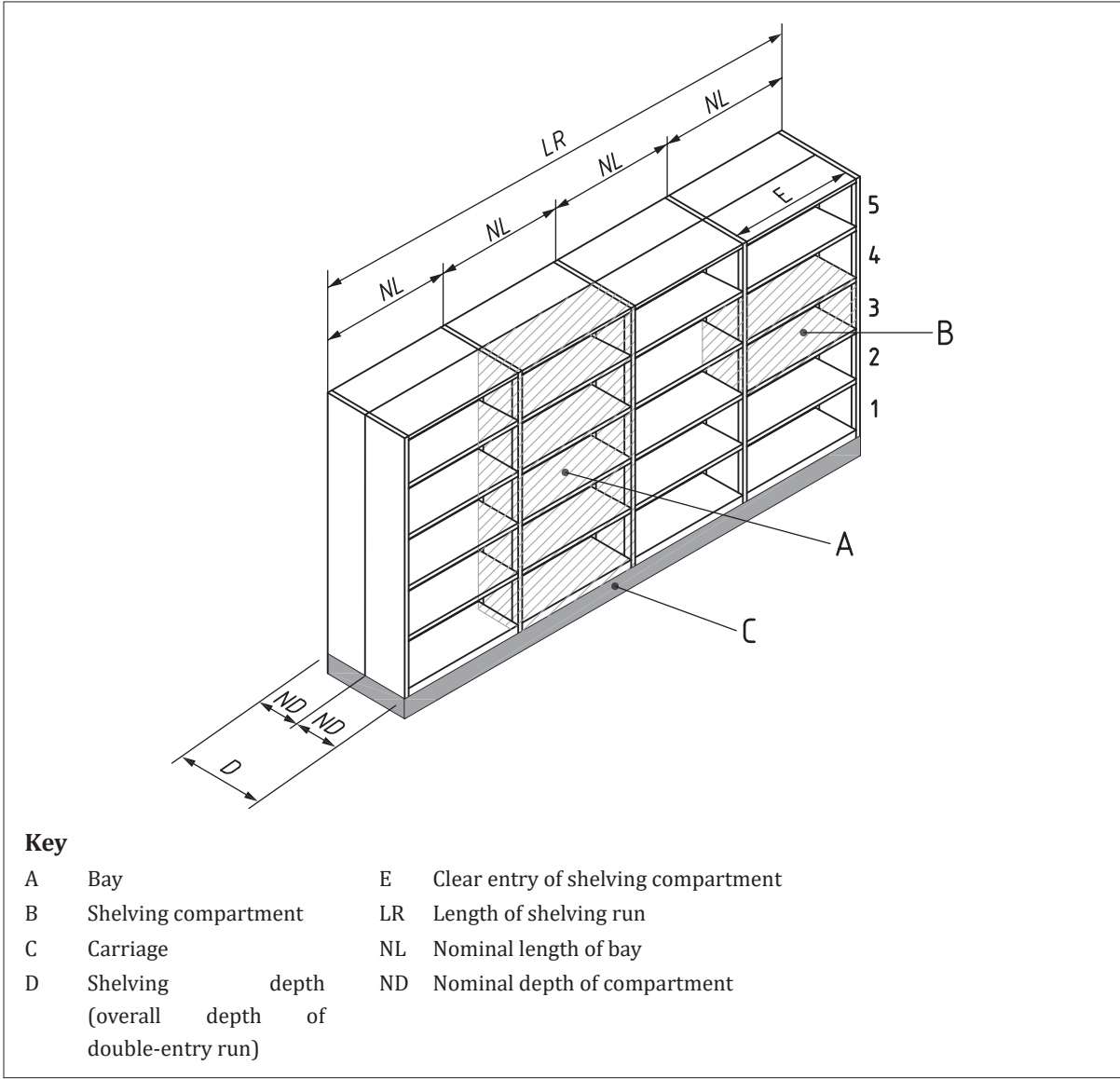
3.20 bay

unit of shelving consisting of horizontal shelves between a pair of uprights or upright frames

NOTE 1 See [Figure 1](#).

NOTE 2 These units may be single- or double-sided.

Figure 1 — Example of a run of bays



3.21 bay load

total allowable weight of all the unit loads in a bay not including unit loads which might be stored on the floor of the bay

[SOURCE: BS EN 15878:2010, 3.2.9]

3.22 value

aspect of importance that individuals or a society assign(s) to an object

NOTE 1 Values can be of different types, for example: artistic, symbolic, historical, social, economic, scientific, technological, etc.

NOTE 2 The assigned value can change according to circumstance, e.g. how the judgement is made, the context and the moment in time. Value should always be indicated by its qualifying type.

3.23 significance

combination of all the values assigned to an object

3.24 context

past, present and future circumstances affecting significance

NOTE Context refers to the circumstances, tangible and intangible, in which an object is created, built, used, worshipped, found, excavated, kept, presented, etc.

4 Conservation policy and planning

4.1 General

The collecting body should set out its conservation policy and strategy, which define objectives and actions and how it will protect and preserve its collections, in accordance with 4.2 and 4.3. These documents should be reviewed at least once every five years as part of the planning process.

4.2 Conservation policy

COMMENTARY ON 4.2

A conservation policy is one of the essential corporate documents required by all collecting bodies and is intended to exist alongside and in association with other related policies.

The collecting body should define a conservation policy for the collections it holds and is planning to hold. The conservation policy should contain as a minimum:

- a) a statement of purpose of the collecting body, including its intention to protect and preserve collections;
- b) a commitment to develop an understanding of the nature and needs of the collections and to use this to inform a conservation strategy that aims to help it achieve its purpose;
- c) a statement that sets out its commitment to seeking and maintaining the necessary resources that allows it to carry out its conservation strategy, including long term growth of collections and formats as appropriate; and
- d) statements covering its aims for access, retention, handling, copying and sustainability (such as an energy policy) relating to the conservation of its collections.

4.3 Conservation strategy

COMMENTARY ON 4.3

Conservation strategy defines how the collecting body aims to achieve the goals set out in its conservation policy.

The collecting body should develop and maintain a conservation strategy for the collections it holds. The conservation strategy should cover the following as a minimum:

- a) an assessment of collections and specific materials within them, that defines their scale, nature, physical vulnerability and general condition;
- b) an analysis of the environmental needs of material types in the collection and provision for the development of appropriate and sustainable storage and handling environments;
- c) identification and evaluation of risks to the collections, defining hazards, their impact and likelihood and any measures that can be taken to remove or reduce these hazards;
- d) definition and prioritization of the actions and measures necessary to protect and preserve collections and items in storage and in use; and
- e) development of a set of procedures for storage, handling and use of collections.

NOTE Guidance on policy-making, strategy and planning can be found in *Benchmarks in Collections Care for Museums, Archives and Libraries* [1], *Archive Service Accreditation Standard* [2] and PAS 197.

5 Preventive conservation

5.1 Environments for storage

COMMENTARY ON 5.1

The primary means of conserving archive collections is by storing them in a building that provides a safe environment and has structural qualities that protect them from fire, water, theft and other hazards. The relationship between the storage environment and the climate in which materials are used is also a major consideration. Standards for the construction or refurbishment of storage and other related spaces for heritage collections can be found in BS EN 16893.

This clause is divided into recommendations for the storage of traditional archive materials (including books, parchment and paper) and separate recommendations for photographic, audio-visual and electronic media.

5.1.1 Selecting a storage environment

Although no single set of environmental conditions is ideal for storing every type of archive material, to slow the rate of decay of all archive material there should be an emphasis on keeping the temperature low and the relative humidity (RH) moderate as defined in this clause. Some unstable materials should be placed in cold storage if they are to be maintained in their original format (see 5.1.4.2).

The selection of a suitable storage environment for an archive or library collection should be based on the range of materials that it contains and on the long-term sustainability of maintaining those environments. Some very sensitive archive materials (such as cellulose acetate photographs and moving image film) require different conditions from most other traditional archive materials and so should be placed separately in the storage environments defined in 5.1.4.

To ascertain the likely vulnerability of different materials, a survey of the collections should be undertaken and updated periodically. This survey should cover the materials, formats, their condition and the extent and quality of their physical protection (boxes and envelopes, etc). The information generated from the survey should inform conservation policy and strategy (see 4.2 and 4.3), starting with environmental considerations.

The specification process for constructing an appropriate building environment should be in accordance with PD 5454 (until superseded by BS EN 16893).

All storage and other spaces where collections are held should be monitored in accordance with PD 5454 (until superseded by BS EN 16893).

NOTE See Annex A and the further reading section of the bibliography for resources which give more information on the nature and deterioration of archive materials.

5.1.2 Environmental stability

Buildings and rooms intended for the storage of archive materials should be in accordance with PD 5454 (until superseded by BS EN 16893). Their construction should inhibit or prevent external temperature influences and minimize internal heat sources, providing thermal stability, maximizing air tightness and having no internal sources of moisture. Seasonal temperature changes inside the repository should adjust as slowly as possible, within the selected parameters, in order to stabilize RH.

When constructing a new store, or refurbishing a room for this purpose, building designers should seek to achieve a structure within which temperature changes no more than 1 °C in any 24 h period without the use of air conditioning.

NOTE This level of thermal stability will, when combined with low air infiltration rates and the absence of sources of moisture or extraneous heat, aid considerably in maintaining a safe and stable RH environment for collections.

In existing locations, where thermal stability cannot be maintained at less than 1 °C in any 24 h period, such as in an historic building, a conservation assessment should be made of the effects of temperature on the material, including the effects of temperature changes on the RH surrounding the material. Material that is being adversely affected by temperature fluctuation should if possible be moved away from sources of heat or cold outside the recommended range.

All stored material should be packaged to reduce the rate of any RH change caused by temperature fluctuation or other unexpected moisture sources.

5.1.3 Temperature and RH for traditional mixed archive collections

COMMENTARY ON 5.1.3

The levels of stability of temperature and RH that can be achieved in a repository depend largely on the form and era of its construction. This clause gives recommendations for levels that might, if maintained consistently, prolong the life and usefulness of archive and library materials. It is focused on what is safe for the materials wherever they are held. Information specific to the construction of the building itself can be found in BS EN 16893. The recommended ranges of temperature and RH are given as a means of preventing even some sensitive archive materials (see [Annex A](#)) from being compromised when stored alongside less critically sensitive archive material.

Archive and library materials benefit from prolonged storage in cool conditions. Continued warm temperatures maintain a higher rate of decay than consistently cool temperatures or where temperatures are allowed to cool off during colder seasons. Constant warm temperatures throughout the year in storage, often caused by internal heating of adjacent occupied spaces, cause more rapid deterioration of collections.

Buildings and rooms used for the storage of mixed traditional collections that include temperature and RH sensitive materials that cannot readily be separated out (e.g. gelatin emulsion photographs in albums and beeswax seals on parchment documents) should be designed to provide an environment that does not expose the materials, at the hottest time of the year, to temperatures above 23 °C as a cautionary maximum, and which will cool off during the colder months to not less than 13 °C. The annual average storage temperature should be less than 18 °C.

NOTE 1 See also [Annex A](#).

NOTE 2 Particular materials which undergo phase change, severe physical property change, or separation of components at particular temperatures may be separated into a space at a different temperature, or a risk/benefit analysis might justify running the entire, mixed material collection at a higher minimum temperature. Collections that do not include such materials may be permitted to cool to lower temperatures if the RH conforms to the recommendations given in this clause and if acclimatization measures described in [5.3](#) are observed when necessary.

The RH level for storage of traditional mixed archive materials should be not more than 60% and not less than 35%.

NOTE 3 See [5.2](#) for guidance on protecting collections from mould and pests.

NOTE 4 Mould generally begins to reproduce when collections are equilibrated to an RH of the air of 65% or higher. A precautionary maximum RH for mixed archives, to avoid the risk of periods at this dangerous level, is 60% RH, recognizing that brief periods (e.g. less than one day) at a point between 60% RH and 64% RH represent only a slightly increased risk. Prolonged periods above 60% risks a steady increase in the moisture content of the

collections and can result in mould growing inside boxes if the room temperature rises, even when the measured RH of the air outside boxes is showing less than 60%.

The RH inside a box containing archive materials changes at a slower rate than the air in the room in which it is stored. Therefore monitoring the RH of the room air is not a reliable indicator of the RH surrounding the boxed material, so monitoring inside selected boxes should also be carried out. While a rapid increase of temperature in the room gives rise to a reduction in RH measured outside a box, the RH inside will rise initially and if already high (c.60%) when the temperature increase happens could trigger the growth of mould if the higher RH is sustained. For this reason, humidistat control of temperature (sometimes referred to as 'conservation heating') should not be used for managing RH for a boxed archive collection.

NOTE 5 See Hofenk de Graaff, Judith H. (1994), 'Research into the cause of browning of paper mounted in mats' [3] and Padfield, T. (1996), 'Low Energy Climate Control in Museum Stores - a postscript' [4].

Gelatin photographic material stored within a mixed material collection that is allowed to cool below 13 °C should not be exposed to RH at the highest level referred to above (60%). RH should either reduce as the temperature reduces or the material should be stored inside sealed microclimate packages at 50% RH (see also [5.1.4.3](#)).

NOTE 6 See McCormick-Goodhart, M.H. (1996), 'The allowable temperature and relative humidity range for the safe use and storage of photographic materials' [5].

5.1.4 Temperature and RH for photographic, audio-visual and electronic media

5.1.4.1 General

COMMENTARY ON 5.1.4.1

More precise control over moisture content, RH and temperature is needed for photographic and machine-readable media than for traditional archive materials. They are usually composite materials, often with layers of hygroscopic media embedded in or on other forms of substrate, making them vulnerable to deterioration caused by differing expansion and contraction rates.

Most audio-visual formats (audio tape, moving image film, video tape, etc.) and photographic negatives and transparencies are constructed from plastic materials, many of which shrink or decay over time and cause distortions that interfere with or prevent access to the sound and/or image they carry. Because they are prone to decay over a shorter time than older materials such as parchment or handmade paper, they can benefit from colder conditions that slow or even halt this decay.

Detailed guidance on the environment for all of these media formats can be found in the IPI Media Storage Quick Reference [6].

Photographic and machine-readable formats might degrade faster if they are regularly viewed or played in a normal reading room environment. For this reason, copies should be made of such collections and the originals should be stored in a dry or cold (below 0 °C) environment as much as possible. The copies should be viewed or played instead. Some formats, such as cellulose acetate and nitrate-based photographic materials should be stored below 0 °C if the image or information they carry is to be preserved on its original carrier.

5.1.4.2 Unstable photographic and audio-visual media

For unstable photographic and audio-visual media, specialist advice should be sought from a conservator before placing material in cold storage, so that the material is correctly identified, the right level of internal RH will be achieved and the correct packaging is used.