
British Standard

Repair and allied processes for the conservation of documents

Part 1. Recommendations for treatment of sheets, membranes and seals

Conservation des documents, remise en état et procédés connexes

Partie 1. Traitement des feuilles, membranes et scellés.— Recommandations

Reparaturen und verwandte Verfahren zur Konservierung von Dokumenten

Teil 1. Empfehlungen für die Behandlung von Papierbogen, Pergament und Siegel

Foreword

These recommendations have been prepared under the direction of the Documentation Standards Committee.

The first edition of this Part of BS 4971 was published in 1973. Since then, further research into conservation has resulted in changes in some of the techniques of repairing documents. This revised version has been prepared to take account of those changes and, with its publication, BS 4971 : Part 1 : 1973 is withdrawn.

In recent years an increasing awareness of the value of archives has led to an increase in the number of record offices and has also stimulated most private owners of accumulations of documents to take an interest in their preservation. One of the problems of conservation is the sheer quantity of documents now known to be in need of treatment. There are, in addition, difficulties that arise from the variety, and sometimes limited durability, of the materials, inks and colours of the documents, as well as from the variety of materials, chemicals and methods available for their treatment.

This revision differs from the first edition in giving less emphasis to detailed instructions and more to general guidance on choosing the conservation process that will best suit the nature and state of the document, thus allowing greater flexibility in the use of materials and methods. The methods recommended are of proven safety and may be safely undertaken by a trained conservator. Other materials, chemicals and methods that are sometimes used in conservation, are not included, because they are rarely required, because they require further research before they can be established as standard, or because they should be used only by specialists using the proper equipment.

These recommendations do, nevertheless, refer to substances and procedures that may be injurious to health unless adequate precautions are taken. Those who follow the advice given here are not absolved from legal obligations relating to health and safety at any stage. In particular, attention is drawn to the Health and Safety at Work etc. Act 1974.

A bibliography is given in appendix A.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

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Recommendations

1 Scope

This Part of BS 4971 gives recommendations for repair and allied processes used in the conservation of sheets, membranes and seals.

The recommendations apply to treatment that may be necessary to ensure the continued preservation of parchment and paper including attached sheets and seals. Methods of treatment are explained in detail only if information about them is not easily available elsewhere.

These recommendations apply to the conservation of documents in the United Kingdom and other countries with similar, temperate climates. Different methods of conservation may be necessary for documents that will go to countries with non-temperate climates.

NOTE. The titles of the publications referred to in this Part of BS 4971 are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 4971 the following definitions apply.

2.1 archival document. A document that is to be kept permanently in a repository, in as near as possible its original form, for the evidence that the document and its context may afford. The age of the document is not a criterion.

2.2 blast freezing. A process that uses a current of air to cool material rapidly to a temperature not higher than -10°C .

2.3 bleeding. The diffusion of colour from ink or other coloured marks, caused by the dissolution of the colouring matter in a solvent.

2.4 BP quality. The quality specified in a monograph in the *British Pharmacopoeia*.

2.5 buffer. A substance or mixture of substances used to control the pH value of a solution at a predetermined level.

2.6 collagen fibre. The prepared natural swim bladder of certain fish, or sausage casing made from reconstituted cattle caecum.

2.7 cross-linking. A chemical reaction that causes polymer molecules to join together, generally causing decrease of solubility.

NOTE. If cross-linking occurs on ageing, this can make a hitherto reversible process irreversible.

2.8 deacidification. The removal and neutralization of acids present in paper and, sometimes, the addition of alkaline material.

2.9 encapsulation. Process of placing non-adhesive transparent supports on each side of a document and fastening their edges.

2.10 enzymes. Naturally occurring, complex proteinaceous substances that act as catalysts in speeding up specific biochemical reactions.

2.11 evidential holes. Holes in a document that provide evidence of its history, e.g. worm holes, holes for filing thongs and, in parchment, holes that were in the skin before text was applied.

2.12 fumigation. Destruction of microbiological or insect infestation by the use of gaseous or readily volatile poisons.

2.13 fungicide. A chemical agent that, under defined conditions, is capable of killing fungi and their spores.

2.14 heat-set. A thermoplastic adhesive coating on tissue, usually a blend of hard and soft acrylic emulsions in water, made either in the workshop or commercially, that sets after heat has been applied.

2.15 illuminated manuscript. A manuscript decorated or illustrated with colours, gold or silver.

2.16 insecticide. A chemical agent that, under defined conditions, is capable of killing insects and their larvae, eggs and pupae.

2.17 lamination. Fastening of sheets of woven fabric, tissue or transparent plastics material with transparent adhesive to one or both sides of a sheet of paper to strengthen and protect it.

2.18 leaf-casting. A process that uses a suspension of paper pulp, applied by vacuum suction, to fill in missing areas of a document.

2.19 long-fibred repair. A repair process that uses the long fibres of oriental paper.

2.20 machine direction. Direction in which paper travels through a paper-making machine and in which the majority of fibres lie.

NOTE. Paper normally folds more easily along the machine direction but the fold is weaker than in the cross direction: when wet, paper expands more in the cross direction, with a corresponding shrinkage when it dries (see also BS 3203).

2.21 make-up. The method and order of fastening membranes or sheets together to constitute a complete document or volume, or the manner in which a single sheet is folded.

2.22 pH value. A measure of the intensity of acidity or alkalinity as distinct from its quantity.

NOTE. Measured on a logarithmic scale, pH 7 is neutrality, values below 7 indicate acidity, which increases as the number decreases, and values above 7 indicate alkalinity, which increases as the number increases.

2.23 plasticizer. A chemical added to resins and other substances to impart flexibility.

2.24 reagent grade. The grade of chemical commonly used for laboratory work when small amounts of impurities will not harmfully affect the behaviour of the reagent.

2.25 relaxation. Process of making a document more flexible in order to rectify over-tight folding, creasing, cockling or distortion, without strain or damage.

2.26 release paper. Paper coated with a stable layer of material, such as a silicone resin, to which other substances such as adhesives do not stick permanently.

2.27 restoration. Processes, including reconstruction of missing detail, used to bring a document back to its original appearance.

NOTE. This is not acceptable in the treatment of archival documents.

2.28 size. A solution applied to paper or parchment to reduce water absorbency and strengthen the paper or parchment.

2.29 translucent material. Repair material through which the text on a document can be seen only when the material is in direct contact with the document (see BS 3203).

3 General principles

3.1 General

If the conservator is in doubt about the most suitable treatment for any document, he should seek specialist advice.

3.2 Integrity of documents

Custodians of archives are responsible for maintaining the integrity of the documents in their care. Evidence of a document's original make-up may, at some time, be required to establish its integrity. Repair material should therefore be easily distinguishable from the original document and should be capable of being undone without damaging the document.

3.3 Future use

Repair work should be designed to suit the future use and conditions of storage of archival documents. For example, a document that is likely to be frequently exhibited or consulted may well require different treatment from one that will rarely be exhibited or consulted.

3.4 Appearance of repair work

Although treatment to prolong the life of an archival document is not a process of restoration, the appearance of the finished work should be aesthetically acceptable, as far as the recommendations of 3.2 allow.

3.5 Tests before treatment

In order to minimize the risks of damaging a document during treatment, it is essential that inks or colours are tested (see appendix B) and that the other tests described in these recommendations are carried out before the documents are treated. The contact time of the test should be approximately that of the intended treatment. Documents that have loose or friable pigment require special consideration and should not be tested as recommended above.

3.6 Fume cupboards

Fume cupboards should have the rate of extraction appropriate to the chemicals used (see Health and Safety at Work etc. Act 1974). They should be sited in accordance with the recommendations of DD 80 : Part 2.

3.7 Swelling of repaired areas

When single sheets are repaired in the same areas on the edges or within the margins of each sheet, the conservator

should take into account that the increase in thickness of the repaired areas may cause excessive swelling if the sheets are bound or boxed. This should be avoided because it can cause distortion and, possibly, fracture of unrepaired areas of fragile sheets. For further information about archival binding, see BS 4971 : Part 2.

3.8 Erasers

Erasers made of solid or granular material containing vulcanized fatty oil should not be used because they may leave harmful residues.

3.9 Water

Unless otherwise stated, water complying with grade 3 of BS 3978 should be used in the preparation of reagent solutions or in analytical determinations, and whenever possible elsewhere.

NOTE. Grade 3 water may be produced, for example, by single distillation, by deionization or by reverse osmosis.

3.10 Health and safety

The chemicals referred to in these recommendations may have physical and chemical properties that present significant health and safety hazards. The conservator should check whether there are hazards before handling any chemical.

4 Preparation for treatment

4.1 Repository

Material should be selected for treatment only after a survey has determined the overall needs, in terms of the state of the material, conditions of storage and nature of use, of the repository. Priorities for treatment should be regularly reviewed, with due consideration of the resources available for it.

4.2 Documents

The constituents of documents should be tested before treatment to ascertain whether the treatment proposed is suitable. In particular, inks and pigments should be tested to determine whether they are acid or soluble, or loose or friable (see appendix B).

4.3 Materials

All materials used for conservation should be tested both for applicability to the documents and as efficacious in themselves. It is essential that the strength of solutions and deacidification agents is maintained.

4.4 Solvents

It is essential that solvents (see appendix C) and solutions used to remove adhesives (see appendix D) should not alter or dissolve any colour in the document. An impervious material, e.g. cellulose acetate or paraffin wax, which is inert both to the document and to the solvent or solution, may be applied to sensitive areas of a document to protect them. If an adhesive is to be removed from a fragile or fragmented document (see clause 12), the document may

be consolidated with a permeable material or fastened with such a consolidant to a suitable tissue that will support it during treatment.

4.5 Records

All details of the document, its condition and make-up before treatment, and of materials, chemicals and methods used in the treatment should be recorded, and, if appropriate, the document should be photographed before, during and after treatment.

5 Treatment of infestation

5.1 Introduction

Infestation will be largely prevented if the repository is kept clean and the right environmental conditions are maintained (see BS 5454). Documents and other materials brought into the repository should be tested for infestation and promptly treated if it is found.

5.2 Methods

Deep freezing is the safest and most effective method of penetrating material and killing insects and their eggs. Fumigation is necessary for treating microorganisms.

5.3 Preparation

Infested documents should be cleaned before they are treated (see clause 6). If they are to be frozen, they should be made into bundles up to 50 mm thick, packed in polyethylene bags or clingfilm, with the air squeezed out, and sealed. Books should be packed separately to prevent bindings from sticking. The bundles should be packed loosely in crates. If documents are to be fumigated, they should be so placed in the chamber that all parts are exposed to the fumigant. Books should be fanned out and placed on slatted shelves. Loose papers should be spread out or hung on lines. Documents weakened by infestation should be individually supported.

NOTE. To avoid breathing in mould spores and dust, the conservator should either wear a suitable dust mask when cleaning documents, or clean them in a fume cupboard.

5.4 Deep freezing

Blast freezing is preferred. Failing this, documents should be frozen as quickly as possible with plenty of air circulating round them to hasten freezing. They should be kept at approximately -29°C for at least three days and then allowed to return to normal room temperature and humidity gradually.

5.5 Fumigation

5.5.1 General. Fumigation is generally the best way of treating infestations of insects and microorganisms. The most effective method is to apply the fumigant in a vacuum chamber. Because the fumigants used are toxic, this method should be left to specialists. Fumigants that are of low mammalian toxicity, are inert to the document and do not leave a residue in the material are preferred. See also appendix E.

5.5.2 Precautions. Fumigants may be toxic in certain circumstances and the provisions of the Health and Safety at Work etc. Act 1974 need to be observed, wherever the fumigants are used. A high level of local exhaust ventilation is essential for rooms that are used as fumigating chambers or contain fumigation boxes. The conservator should wear appropriate protective gloves and should handle solutions in a suitable exhaust draft or fume cupboard.

5.6 Small mammals

Specialists should be called in to deal with infestations of small mammals and birds. For further information see BS 1133 : Section 5.

5.7 Direct local treatment

5.7.1 Documents. A solution of a suitable fungicide (see appendix E) in a suitable solvent (see appendix C) may be applied to the surfaces of documents to eliminate small isolated patches of mould growth. In exceptional circumstances a document may be immersed in a dilute fungicidal solution.

5.7.2 Fittings. Suitable fungicidal solutions may also be applied to the surfaces of shelves, boxes and other fittings to eliminate mould growth. Some insecticides may be applied to the surfaces of fittings (see appendix E).

5.8 Interleaving tissues

If other methods of fumigation are not practicable for treating books, interleaving tissues impregnated with a volatile fungicide (see appendix E) may be used to inhibit active microbiological growth. The method is as follows.

Dip small sheets of thin, strong, acid-free, absorbent paper in the fungicide solution and allow them to dry in a current of air in a well-ventilated place, preferably a fume cupboard, away from naked flames. Store the tissues in an airtight box or impervious bag. Put single sheets of impregnated tissue between leaves of the book at intervals of 3 mm throughout the book's thickness.

6 Cleaning

6.1 Mechanical cleaning

6.1.1 General. Surface dirt, mould and slight insect infestation may be removed from paper or parchment mechanically if:

- (a) the image is not at risk;
- (b) the material is firm enough to withstand the treatments described in 6.1.2;
- (c) the document is dry, otherwise the dirt will tend to smear and be worked into the surface of the document.

Extra care should be taken if the document bears illumination or decoration. If the document has mould or slight insect infestation, the conservator, wearing a suitable dust mask and gloves, should clean the document in a fume cupboard, if possible, or in the open air. For treatment of heavy insect infestation see clause 5.

