

Conservation of cultural heritage - Procedure for the analytical evaluation to select cleaning methods for porous inorganic materials used in cultural heritage

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English Version

Conservation of cultural heritage - Procedure for the analytical evaluation to select cleaning methods for porous inorganic materials used in cultural heritage

Conservation du patrimoine culturel - Procédure pour l'évaluation analytique et le choix des méthodes de nettoyage des matériaux inorganiques poreux dans les bâtiments d'intérêt patrimonial

Erhaltung des kulturellen Erbes - Methodologie für die analytische Prüfung zur Auswahl von Reinigungsverfahren von porösen anorganischen Objekten des kulturellen Erbes

This European Standard was approved by CEN on 23 May 2021.

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European foreword

This document (EN 17488:2021) has been prepared by Technical Committee CEN/TC 346 “Conservation of Cultural Heritage”, 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of an identical text or by endorsement, at the latest by December 2021, and conflicting national standards shall be withdrawn at the latest by December 2021.

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

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Introduction

Cleaning is the removal of unwanted material from an object surface or near-surface.

A cultural heritage object is irreplaceable and while cleaning is undertaken for object conservation, its effects are irreversible. Failure to consider and address the technical problems which can arise during cleaning may cause irrevocable damage to an object. Cultural heritage should be cleaned using the least disruptive/invasive procedure possible in order to best preserve it.

Furthermore, an inadequate or inappropriate intervention may cause, or increase, future deterioration processes or eliminate materials which are undocumented or which would allow a greater understanding of the history of an object.

The actions required for cleaning involve a degree of risk for the object and therefore demand extreme caution. The chosen methods for cleaning should not be harmful to the object, the operator, the surroundings /environment, or users of the site.

Cleaning operation needs to take into account the compatibility definition (EN 15898) as the “extent to which one material can be used with another material without putting significance or stability at risk”. Extending the definition of compatibility to the cleaning action a “compatibility analysis” should therefore ascertain how cleaning actions (in terms of effectiveness and harmfulness) would impact on the significance and stability of the heritage object.

A successful cleaning strategy needs to adhere to the strategy for the whole conservation-project in accordance with the conservation-process and the condition report (EN 16853, EN 16085 and EN 16095) and requires careful consideration of a number of aspects which include but are not limited to:

- the significance of the object;
- the aim of the cleaning;
- a clear definition of the nature of the materials to be removed and the rationale;
- context and sensitivity of the object to be evaluated (for example presence of polychrome and gilt surfaces);
- condition of the substrate, which may result in greater risk of harm during testing;
- form of the substrate (flat or carved surface).

These factors may exclude the use of one or more cleaning methods, which would be unsuitable.

This document takes into account the extreme variability of both the constituent materials and the conditions of the object, prescribing a procedure of analytical tests and comparing the extent of possible damage, which may result from each cleaning method tested.

“Harmfulness” indicates the level of risk of the variety of unwanted changes, which may appear not only in short-term but also in long-term after cleaning.

This may include the deterioration of the substrate, the change of porosity or surface roughness, the release of residual substances and formation of stains, which are not compatible with the material and or which could interfere with future conservation intervention.

The potential harmfulness of a cleaning method may be greater when it is applied to a deteriorated material.

Evaluation of effectiveness and potential harmfulness of cleaning methods need to be carried out on site by establishing a “trial area” as a preliminary step before any extensive work is started.

The process of cleaning requires careful evaluation throughout the work. This is initiated at the primary evaluation through the execution of trials and continues with the monitoring and optimization during the selected process. Trials aim to identify the method(s) of cleaning which produce an acceptable result at minimum risk to the object. Even an extensive sampling procedure may fail to identify all the conditions which exist on a cultural object therefore ongoing evaluation of the cleaning and the effects on the substrate are vital. If necessary, cleaning needs to be halted to re-appraise the methods used or to undertake further testing where areas of increased sensitivity or uncertainty are uncovered. This document identifies the means by which cleaning methods may be selected and evaluated as part of conservation interventions.

Unwanted interactions may arise from different substrate and cleaning method combinations. Some features of a given substrate may cause it to be particularly damaged depending on the method and circumstances of its use. These specific combinations will increase likelihood of damage. In some circumstances the synergistic effects can be easily predicted, e.g. a salt-laden wall masonry may be seriously affected by a water-based method, even if we know that generally this cleaning method is gentle and of low aggressiveness. The assessment of the synergistic effects should take into consideration that damage may emerge after some considerable elapsed time.

The initial assessment for a building or similar immovable object will take place on site with non-invasive systems. If necessary, it may be followed by appropriate micro-invasive or invasive laboratory analysis (Figure 1, Table 1).

As there are many different cleaning methods and the results can vary greatly it is necessary to carefully evaluate any proposed technique/system before trial and subsequent application. Reference to standard EN 17138 is required to undertake this.

Cleaning methods considered in EN 17138 were divided into four categories: Water cleaning, mechanical cleaning, physical cleaning and chemical cleaning. Each method requires different considerations in order to select the most appropriate investigations.

Assessment of harmfulness for chemical cleaning methods needs additional investigation with respect to the possible interactions between the chemicals and the products to be removed, notably the formation of by-products which could be harmful for the substrate. As a consequence, the procedure for chemical cleaning will follow a different pathway (Figures 2 and 6, Table 1).

The document is composed of two parts:

- a) General procedure (Part A) to be applied when the evaluation of the effects of cleaning of a cultural heritage object surface is needed.
- b) Analytical procedure (Part B) for testing cleaning methods under development on specimens of analogous material similarly decayed.

Cleaning methods and materials, which are under development should not be evaluated on cultural heritage objects surface but they should be tested according to the analytical procedure described in part B.

1 Scope

This document gives the test methodology for evaluation of both harmfulness and effectiveness of a cleaning method as applied to porous inorganic materials. Mural paintings and polychromy are excluded.

Evaluation includes the use of on-site analyses and/or laboratory studies.

The evaluation of the potential harm has a higher priority than the effectiveness in order to prevent overcleaning. It is important that cleaning is always at the minimum level deemed effective and that it respects the original surface and finishes. Overcleaning is a term used to indicate that irreversible damage has been done by the unnecessary removal of materials, which are part of the value of the object.

This document applies to:

- a) Part A: all methods of cleaning, which have characteristics of parameterization and reproducibility (see EN 17138).
- b) Part B: all new methods that are under development.

This document applies to evaluate the optimum methods for cleaning and the optimization of the parameters of the selected cleaning process.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 15801, *Conservation of cultural property - Test methods - Determination of water absorption by capillarity*

EN 15886, *Conservation of cultural property - Test methods - Colour measurement of surfaces*

EN 16095, *Conservation of cultural property - Condition recording for movable cultural heritage*

EN 16096, *Conservation of cultural property - Condition survey and report of built cultural heritage*

EN 16302, *Conservation of cultural heritage - Test methods - Measurement of water absorption by pipe method*

EN 16455, *Conservation of cultural heritage - Extraction and determination of soluble salts in natural stone and related materials used in and from cultural heritage*

EN 16515:2015, *Conservation of Cultural Heritage - Guidelines to characterize natural stone used in cultural heritage*

EN 17138:2018, *Conservation of Cultural Heritage - Methods and materials for cleaning porous inorganic materials*