
British Standard Code of practice for

Cleaning and surface repair of buildings

Part 2. Concrete and precast concrete masonry

Code de bonne pratique pour le nettoyage et la réparation des façades de bâtiments
Partie 2. Maçonnerie en béton et en béton préfabriqué

Anleitung zum Reinigung und zur Oberflächenreparatur von Gebäuden
Teil 2. Mauerwerk aus Beton und Betonfertigteilen

Foreword

This Part of BS 6270 has been prepared under the direction of the Elements and Components (of Diverse Materials) for Buildings Standards Committee. It is intended to give building owners, architects, surveyors, engineers and contractors general background information when considering cleaning and surface repairs*.

Part 2 of BS 6270 describes the main methods in common use for cleaning and surface repair of concrete and draws attention to some of the problems encountered in practice. However, in view of the widely differing ages, materials and locations of buildings, only general guidance is given to enable the user to select the most appropriate method for the particular building concerned.

The methods described in this code are not suitable for use on lime stucco, oil mastic or sgraffito. For guidance see Department of the Environment Directorate of Ancient Monuments and Historic Buildings Research and Technical Advisory Note No. 6 'External Renders' and 'Mortars, Plasters and Renders in Conservation' by J Ashurst, published by the Ecclesiastical Architects' and Surveyors' Association.

Where the code recommends seeking specialist advice, information may be obtained from organizations represented on the committee (see the committees responsible on the back cover).

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

In particular, attention is drawn to the following regulations applying to cleaning and surface repair work.

Construction (General Provisions) Regulations 1961
Factories Act 1961.

Health and Safety at Work, etc. Act 1974.

Abrasive Wheels Regulations 1970.

* The term 'surface repairs' has been used throughout in place of the term 'restoration' to make it clear that the work may not restore the material, surface or construction.

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Section one. General

1 Scope

This Part of BS 6270 gives recommendations for the cleaning and surface repair of concrete and precast concrete masonry, excluding cast stone, which is covered by BS 6270 : Part 1. It does not cover lime stucco, oil mastic and sgraffito or repairs to sand and cement renderings.

NOTE 1. Where work on features of historic or artistic importance is being considered, guidance from specialists should be sought, since the general recommendations given in this code may need to be supplemented.

Structural repairs (see 2.1) are not covered by this code.

NOTE 2. For guidance on the structural use of masonry and concrete, reference should be made to BS 5628 and BS 8110*.

NOTE 3. Where there is any doubt about the structural nature of defects, advice should be sought from a chartered civil or structural engineer or other appropriately qualified person.

NOTE 4. The titles of the publications referred to in this code are listed on the inside back cover. See also appendix B for a bibliography.

2 Definitions

For the purposes of this code the definitions given in BS 6100 or in the British Standard for the given material or component apply, together with the following.

2.1 structural repairs. Repairs required to ensure that a structure will continue to carry existing loads, and/or to enable the structure to carry additional loads, with an acceptable factor of safety.

3 Preliminary considerations

3.1 General

Since there is no such thing as a maintenance-free construction, the following essential points should be borne in mind.

- (a) The past history of the building should be examined, first checking any records that may exist.
- (b) The need for surface repairs should be distinguished from the need for structural repairs (see 2.1). If in doubt, specialist advice should be sought.
- (c) Where cleaning and/or surface repair work is to be undertaken, the causes of the dirt or defects should be established.

3.2 Reasons for cleaning

3.2.1 Introduction. It is convenient to classify reasons for cleaning under two headings: aesthetics and maintenance. In practice, cleaning a building for aesthetic reasons may reveal the need for maintenance.

Dirt does not necessarily harm building materials and a visually acceptable and established pattern of weathering need not be disturbed.

3.2.2 Aesthetics. Even where maintenance is not required cleaning may be required in order:

- (a) to reveal the nature, colour or details of an existing building;
- (b) to unify the appearance of a building which has been altered, extended or repaired;
- (c) to facilitate the choice of suitable materials for a proposed extension or for repairs;
- (d) to reflect more light on to other buildings;
- (e) to promote personal or civic pride.

3.2.3 Maintenance. It may prove necessary to clean the building for either of the following reasons:

- (a) to remove harmful deposits from the fabric;
- (b) to expose defects in order to establish the extent and nature of repairs needed.

3.3 Reasons for surface repairs

3.3.1 Introduction. The reasons for undertaking surface repairs also may be classified under two headings: aesthetics and structural preservation.

3.3.2 Aesthetics. The only surface repairs undertaken solely for aesthetic reasons are those that have no particular beneficial effect on the fabric, structure or weather resistance of the building. This includes such work as the repair of decayed or eroded ornamentation, statuary and surface decoration, or the removal and replacement of areas which have become permanently stained or been repaired inappropriately in the past.

3.3.3 Structural preservation. Whilst this code does not cover structural repairs, most surface repairs which come within its scope are concerned with the prevention of ingress of moisture and with the repair or replacement of elements which have suffered damage and therefore contribute to structural preservation. In particular, structural preservation may be required in order:

- (a) to restore the weather resistance of the building;
- (b) to repair surface defects likely to affect, in the long term, the stability of the whole structure or of parts of the structure;
- (c) to replace defective fixings;
- (d) to reinstate the surface of the building after structural repairs.

3.4 Buildings of architectural or historic interest

Where the building concerned is statutorily listed or in a conservation area, the local authority may discourage or even prohibit the cleaning of individual buildings, so as to conserve the uniform appearance of whole streets or areas.

Where work on features of historic or artistic importance is being considered, guidance from specialists should be sought, since the general recommendations given in this code may need to be supplemented.

Care should be taken not to remove traces of the original design or colouring where these may be of architectural or historic interest.

NOTE. Notice to the Department of the Environment of work on buildings scheduled under the Ancient Monuments Act is required by law.

* In preparation. Revision of CP 110.

4 Choice of method

As there are many ways of cleaning and repairing buildings, and a wide range of building and materials has to be considered, it is not possible to recommend general methods to suit every case encountered in practice. Each project should be considered carefully in the light of all available methods and of previous experience with the building in question or other similar buildings. The method to be adopted should be established before tenders are invited.

It is essential to identify correctly all materials, both those being treated (see clause 9) and those to be removed (see clause 10). It is necessary to consider possible detrimental interactions between cleaning agents and the materials and construction of the building. Acid based chemical agents, e.g. hydrochloric acid (HCl), could cause damage to reinforced concrete structures, owing to the increased stress in the reinforcement following reductions in cross section. This effect can become acute when dealing with prestressed or post-tensioned concrete elements.

In certain cases it may be advisable to clean a trial area using the proposed method. The trial area should include building features, e.g. movement joints.

Buildings will display a variety of surfaces and sometimes a variety of materials. Each needs to be cleaned or repaired by an appropriate method, which might mean that more than one method needs to be used when cleaning or repairing the whole building. Treatment of one material or surface may harm another adjacent material or surface, e.g. sealants and movement joint fillers may be affected by chemical cleaning agents. In all cases adequate protection should be provided where necessary.

Given the relative cost of different methods, the choice of method should take into account all the factors listed in table 1.

5 Services

Before choosing a method, it is necessary to ascertain which of the services listed below are adequate and in working order:

- (a) water supply;
- (b) drainage (see 7.2);
- (c) electricity.

6 Means of access to work

The choice of the means of access depends on the geometry of the building, the type of work and the duration of the work. The cost of access should be treated as part of the total cost and not considered in isolation, since expensive systems may sometimes prove to be more economical in total cost. Reference should be made to BS 5973, BS 5974 and BS 6037.

Table 1. Summary of factors affecting choice of method

Factor to be considered	Remarks
1 Type and condition of surface	Includes profiled finishes
2 Type and condition of material	See clause 9
3 Amount and type of deposits to be removed	See clause 10
4 Type and use of building	See notes 1 and 2
5 Location of building	See notes 1, 3 and 4
6 Availability of services	See clause 5
7 Disturbance to public and occupants: dirt, dust, noise, chemicals	See clause 8
8 Speed of work	See table 3
9 Likely weather conditions	See 7.5 and note 1
10 Interior work	See 7.1
NOTE 1. The height of a building and its relationship to public ways may make the use of abrasion or chemicals a hazard, particularly in very windy conditions (see clause 8). NOTE 2. Buildings of architectural or historic interest require special consideration (see 3.4). NOTE 3. The type of environment may be significant, e.g. industrial or marine. NOTE 4. The nature and condition of adjoining buildings also may influence the extent and method of work.	

7 Protection of buildings

7.1 General

Before any cleaning or surface repair work is done, it is necessary to consider what protection or temporary support the building or adjacent buildings will require.

The following are the principal precautions to be considered.

- (a) Before cleaning, it is essential to seal any fractures and similar structural defects temporarily and to protect joints in order to prevent entry of cleaning agents.
- (b) External fixtures, such as illuminated signs or nameplates, should be protected or, preferably, removed and stored for subsequent replacement, unless otherwise specified. The electricity supply to these fixtures should be disconnected.
- (c) Decorative fixtures, such as balustrades, cornices and ornamentation, may need to be protected against damage.
- (d) When cleaning interior surfaces, special precautions may be necessary to protect other parts of the structure, such as floors and woodwork, and the contents of the building, e.g. electronic equipment, monuments, organs, paintings.

(e) To avoid rust staining of the building, steel scaffolding should not be used unless it is suitably protected against corrosion. Where scaffolding is tight against the building surface, the ends should be capped. The parts of the building masked by the scaffold tubes should be cleaned separately.

(f) It may be necessary to fit runner wheels on the sides of suspension cradles, other than those guided by fixed rails, and buffer pads round the sides of all mobile work platforms.

(g) During the course of work, debris should be collected from each lift of scaffolding and/or cradles and not swept off or thrown on to the ground, as this can damage other parts of the building.

7.2 Water cleaning

Usually the normal rainwater drainage systems are adequate to take the amount of water used in cleaning the exterior of the building. However, before work is started, the system should be inspected to ensure that it is of adequate capacity and free from blockage. Where oil residues are being washed away, an interceptor should be provided (see 10.5).

Before starting work inside a building, particular consideration should be given to the disposal of waste water.

7.3 Air or water abrasive cleaning

Before starting air or water abrasive cleaning, all windows, doors, etc. should be protected. Care should be taken when fixing or removing adhesive tapes, as these can cause damage to the surface.

Hopper heads, rain water gullies and outlets should be covered and protected from the accumulation of spent abrasive. Similarly, intake fans and air inlets should be protected.

Spent abrasive should be collected and cleared from the site at regular intervals.

7.4 Chemical treatments

Consideration should be given to protecting windows and exposed surfaces other than those being cleaned, depending on the type of chemical being used. Care should be taken when fixing or removing protective materials (see 7.3).

7.5 Weather conditions

All wet methods of cleaning and surface repair, including making good spalling (see 13.6), should be suspended, or suitable protection provided, if there is a risk of the building fabric becoming frozen whilst saturated with water. However, dry cutting out in preparation for surface repairs may proceed.

8 Protection of workers and public

8.1 General

To ensure protection of the public, the area where work is being carried out should be close sheeted. In addition, protective barriers may be required to prevent people passing under or near the working area.

All electric cables and fittings likely to be affected by the work should be disconnected and suitably protected before any work is begun.

Apart from taking these and other safety precautions common to all construction work, special measures are necessary when using certain cleaning methods, which are dealt with in 8.2 to 8.4.

8.2 Air and water abrasive (grit blasting) processes

8.2.1 Protection of workers. To safeguard workers, the following precautions should be taken during air and water abrasive cleaning.

(a) The use of abrasive materials containing free silica, such as flint and sand, should be avoided, as this can create health hazards (see 11.6.1).

(b) When using an air pressure gun suitable protective clothing, including an air-line helmet, should be worn.

(c) The air-line helmet should be supplied with clean air at a positive pressure, to prevent ingress of dust, preferably using an in-line air filter.

(d) Compressors, pipes and air lines, including couplings, connectors, etc. should be inspected regularly and tested.

(e) All air lines and pipes should be attached securely to the scaffolding on which work is in progress, bearing in mind the recoil of the gun due to the air or water pressure.

(f) The gun should be fitted with a 'deadman's handle' or a 'fail-safe'.

(g) Scaffold boards and cradles should be cleared regularly of debris and dust, as described in item (g) of 7.1.

8.2.2 Protection of public. Noise levels should be kept to a minimum. For further guidance see BS 5228. Careful consideration should be given to the siting of compressors; in some cases, it may be desirable to move the compressor into a different position each day. The acoustic covers on the machine should be kept closed and, where the degree of noise is critical, e.g. near hospitals, the compressor should be installed in an acoustic shelter.

8.3 Chemical cleaning

It is essential to take special precautions when using chemicals (see BS 6270 : Part 1). No application or rinsing method should be allowed to give rise to fine droplets which could be wind-borne as mist.

Any dangerous chemicals left on site should be stored in securely locked premises.

Adequate supplies of clean water should be available for drenching spillage of solutions onto clothing or parts of the body. Eye irrigation bottles filled with clean water should be kept immediately to hand.

Operators should be made aware of the precise type of chemicals being used so that they may advise doctors or hospital staff treating any injuries. Some suitable first aid treatments are described in appendix A.

8.4 Mechanical cleaning

Abrasive wheels should be used only by a trained operator, wearing eye protectors complying with BS 2092.