

Code of practice for

External renderings

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Elements and Components (of Diverse Materials) for Buildings Standards Policy Committee (ECB/-) to Technical Committee ECB/5, upon which the following bodies were represented:

- Aggregate Concrete Block Association
- Association of Lightweight Aggregate Manufacturers
- British Aggregate Construction Materials Industries
- Building Employers Confederation
- Chartered Institute of Building
- Concrete Society
- Contract Flooring Association
- Department of the Environment (Property Services Agency)
- Department of the Environment (Building Research Establishment)
- Federation of Association of Specialists and Sub-Contractors
- Federation of Plastering and Drywall Contractors
- Institution of Structural Engineers
- Mastic Asphalt Council and Employers' Federation
- Mortar Producers' Association Limited
- National Federation of Terrazzo — Mosaic Specialists
- Royal Institute of British Architects
- Sand and Gravel Association Limited
- Scottish Master Plasterers' Association
- Society of Chemical Industry

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Autoclaved Aerated Concrete Products Association
- External Wall Insulation Association
- National House-Building Council

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Foreword

This British Standard has been prepared under the direction of the Elements and Components (of Diverse Materials) for Buildings Standards Policy Committee. It is a revision of BS 5262:1976, which is withdrawn.

The standard gives recommendations for building details, design and materials considerations, the selection of mixes and the application of cement-based external renderings.

A rendered finish may be applied to a variety of backgrounds, either to improve resistance to rain penetration and weathering or for aesthetic reasons.

In this edition of BS 5262, account has been taken of recent investigations into rendering failures. Recommendations for polymer-modified renderings and rendering over external insulation have been included.

It has been assumed in the drafting of this standard that the application of its provisions is entrusted to appropriately qualified and experienced people, for whose guidance it has been prepared.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i to vi, pages 1 to 36, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1 Scope

This code of practice gives recommendations for cement-based external renderings on all common types of background. It includes renderings on both new and old backgrounds and the maintenance and repair of existing work.

Renderings for liquid retaining structures such as tanks and manholes and renderings applied as a background for any form of cladding are not included.

NOTE 1 For renderings to receive external tiling and mosaics, see BS 5385-2.

NOTE 2 The titles of the publications referred to in this standard are listed on page 36.

2 Definitions

For the purposes of this British Standard, the definitions given in BS 6100-6 apply.

3 Exchange of information

The working drawings and specifications should be prepared in sufficient detail to afford proper guidance in the execution of the work.

When preparing rendering details the designer should take into account the following points.

- a) The choice of type of rendering to be used depends on the functional requirements, the nature and conditions of exposure of the background and the aesthetic requirements. The nature of the background may dictate the type of rendering finish that can be applied and, therefore, the background and rendering system should be considered together.
- b) The area and types of finish and thickness required together with sufficient details of the surfaces to be rendered, architectural features such as string courses, sills, positions of damp-proof courses, etc., to enable the most suitable rendering materials and methods to be selected.
- c) The possibility of a bonding treatment being required to ensure good adhesion between the rendering and the background.
- d) The likelihood of inclement weather (see **45.1**).
- e) The type of scaffolding to be used and items in need of protection (see clauses **40** and **41**).
- f) The method of curing required. (See **45.2**.)

There should be an exchange of information between those responsible for the constructional work, the rendering and any subsequent work, and with other trades whose work will affect or be affected by the rendering, as soon as possible after acceptance of contract.

At a reasonable time prior to work commencing, all necessary working drawings should be provided and the site should be visited to monitor building progress. Arrangements should then be made for any necessary preparatory work to be carried out without causing delay to work that is to follow.

4 Building programme

The programme planned for any building work should include external rendering, if applicable. Where possible, the programme should be agreed in consultation with those who will become responsible for carrying out the work.

When considering the programme for machine-applied rendering, it should be remembered that mechanical methods of application can cover larger areas in shorter periods than traditional methods and therefore a greater area should be made available within the programme to allow for this.

In preparing the programme, each operation should be considered in relation to the others, and due consideration should be given to the economical use of construction plant, equipment and scaffolding by all trades. Consideration should also be given in the programme to ensuring that the various trades follow one another in a correct sequence and do not interfere unduly with each others' work. The programme should be carefully planned to avoid risk of serious damage or difficulties occasioned to or by other trades.

The programme should allot times for the construction and preparation of the backgrounds to receive renderings and allow sufficient intervals for drying out and shrinkage of the background to take place. The programme should include times for commencement of rendering and allow for sufficient time between coats for drying out and shrinkage to take place. Due regard should also be given to any special requirements for finishing coats which are usually applied downwards starting from the top.

A detailed programme for the work, prepared in consultation with those responsible for the general building contract, should be maintained.

Arrangements should be made and time allowed for regular site inspections to enable any defects to be located and remedied, and for drying out and maturing of such repairs at the correct stages as the work proceeds.

The date when each area is rendered should be recorded. Records should also include critical dates concerning the building construction, weather conditions and the preparation of backgrounds for rendering.

Section 2. Materials

5 Cements

Cement should comply with one of the following British Standards BS 12; BS 146; BS 4027; BS 5224.

6 Limes

Building limes should comply with BS 890.

7 Aggregates

7.1 Sands

The quality of sands, especially for final coats, should ideally comply with clause 5 of BS 1199:1976. Sands should preferably comply with grading type A in Table 1 of BS 1199:1976.

Experience has shown that some sands which do not comply strictly with BS 1199 can give satisfactory results. However, finer sands should only be used with extreme caution. It is recommended that enquiries be made regarding locally available sands and their uses. The working properties of mixes, their water demand and the behaviour of the finished rendering may all be affected by the choice of sand. The importance of using a properly graded sand cannot therefore be over-emphasized. For undercoats, the coarsest and sharpest sand which can be conveniently handled should be employed.

The most suitable grading of sand for the final coat will depend, to some extent, upon the finishing treatment. The same grading used in the undercoats will be suitable for some finishing coats such as floated, scraped and dry dashed. For some textured finishes however, such as those produced by treatment of the freshly-applied final coat with a tool, it may be desirable to remove the coarser particles, e.g. by screening. For others, such as "torn" textures, a slightly larger proportion of material coarser than the 5 mm size (see Table 1 of BS 1199:1976) may be needed.

NOTE Sands derived from certain sources, notably some areas in southern Scotland and the north of England, are themselves prone to shrinkage and their use can result in higher shrinkage movements of the rendering than might be experienced with other sands.

7.2 Coarse aggregate

Natural aggregate other than sand should comply with the appropriate clauses of BS 882 or BS 63-2.

7.3 Artificial aggregates

Artificial aggregates manufactured or derived from industrial by-products may be used but care should be taken to ascertain that they have adequate durability and have no adverse effect upon the rendering or the background. They should comply with British Standards where applicable.

8 Pigments

Pigments should comply with BS 1014. However, BS 1014 does not cover a full range of colours and other pigments should be used only if they are known to be satisfactory. It is essential that the pigments be stable, unaffected by lime or exposure to light, not easily leached out by water and that they have no adverse effect upon the cement or other constituents of the rendering.

9 Fibres

Fibres may be used in specialized applications such as restoration work, sprayed renderings and renderings on lathing or insulation boards.

Natural fibres should be dry, clean and free from oil or grease.

Alkali-resistant mineral fibres and several types of polymer fibres can be used, both as loose fibre and in premixes. Manufacturers' literature should be consulted for likely improvements to the rendering as well as limitations on use and long term deterioration.

Metal fibres should be of a type that is not adversely affected by alkaline or weak acid conditions.

10 Admixtures

10.1 General

With all admixtures it is essential that the manufacturer's instructions be precisely followed. Overdosage should be avoided:

10.2 Plasticizers

Organic plasticizers to improve workability should comply with BS 4887-1.

NOTE Plasticizers and/or air-entraining agents should not be used in mortars made with masonry cement complying with BS 5224.

10.3 Waterproofers

Integral waterproofers are available as proprietary materials.

10.4 Water-retentive agents

Water-retentive agents are normally cellulose derivatives and are available as proprietary materials.

10.5 Polymer dispersions

Polymer dispersions may be used to improve bond strength, resistance to water penetration and durability. Styrene-butadiene rubber (SBR) and acrylics fall into this category.

11 Bonding agents

Proprietary bonding agents based on styrene-butadiene rubber (SBR) and acrylic polymers improve the adhesion of renderings to smooth surfaces and to low or high suction backgrounds, if incorporated in spatterdash, stipple, adhesive slurry or undercoat mixes. Bonding agents can also promote the hydration of such mixes applied to absorbent surfaces. Manufacturers' instructions concerning the use of these products should be carefully observed.

Where bonding agents are applied directly to backgrounds, it is essential that succeeding renderings be applied before the bonding agent is allowed to dry out, otherwise debonding is likely to occur.

12 Water

Water fit for drinking is suitable for mixes for rendering. Attention is drawn to BS 3148 in cases where water supplies may be of doubtful quality.

13 Ready-mixed rendering materials

13.1 Ready-mixed lime : sand

Ready-mixed lime : sand for mortars should comply with section 2 of BS 4721:1981 and should be mixed with cement on site. Ready-mixed lime:sand may be supplied with pigments (see clause 8) and/or fibres (see clause 9) and/or admixtures (see clause 10) where their use is specified.

NOTE Clause 31 gives recommendations on mixes.

13.2 Retarded ready-to-use cement : lime : sand or cement : sand

Ready-to-use mortars should comply with section 3 of BS 4721:1981 and require no additions on site. (In certain conditions small amounts of clean water may be added, e.g. to replace that lost by evaporation, to maintain the optimum consistency.) Ready-to-use mortars may be supplied with pigments (see clause 8) and/or fibres (see clause 9) and/or admixtures (see clause 10) where their use is specified.

13.3 Bagged rendering materials

Various ready-mixed dry materials supplied in bags are available. Their ingredients should comply with the appropriate recommendations made within this section of BS 5262. Mix proportions and mixing instructions should be clearly stated on the bags.

13.4 Proprietary materials

Users of proprietary rendering materials should satisfy themselves that they are suitable for their intended purpose. The proprietary rendering materials should be applied as recommended by the manufacturer. Included in the proprietary rendering materials that are available are one-coat materials.

14 Reinforcement, metal lathing and beads

14.1 General

All metal reinforcement, lathing and beads of whatever type should be stainless steel or galvanized and should be suitable for external use.

14.2 Expanded metal

Expanded metal should be as specified in BS 1369-1.

14.3 Ribbed lathing

Ribbed lathing should be as specified in BS 1369-1. Ribs are formed integrally with expanded metal thus providing rigidity.

14.4 Welded wire mesh

Plain welded wire mesh should be galvanized after manufacture in accordance with BS 729, or should be of stainless steel. It should be of 25 mm to 50 mm mesh and have wires not less than 1.2 mm diameter. Welded mesh of this kind is used primarily as a reinforcement when rendering over certain backgrounds.

14.5 Non-metallic mesh

Non-metallic mesh should be made from alkali-resistant mineral fibres or plastics.

14.6 Beads and stops

Angle beads, stop beads and render stops should be made from stainless steel that has a corrosion resistance at least equal to Grade 304 of BS 1449-2. Beads and stops made from galvanized steel with a coating of at least Grade 275 as given in BS 2989 may be used provided the arrisses and exposed faces are protected by epoxy coating or polyvinyl chloride (PVC) nosing sheaths. Galvanized bell cast beads may be used without the additional protection.

15 Fixings

15.1 General

The fixings for lathing and beads should be made of a compatible material.

15.2 Nails and pins

Nails should comply with BS 1202-1 and should be galvanized or of stainless steel. Pins for shot-firing should be of steel with a coating of cadmium or zinc in accordance with BS 1706.

15.3 Staples

Staples should be made of stainless steel.

15.4 Screws and bolt fixings

Screws and bolt fixings (including expanding bolts and drill anchors) should be of stainless steel or of steel protected with a coating of cadmium or zinc in accordance with BS 1706 or BS 4921.

15.5 Washers and ancillary angles, brackets or cleats

Washers and ancillary angles, brackets or cleats are often used in conjunction with shot-fired or screwed fixings. They should be galvanized or otherwise suitably coated in accordance with BS 1706, BS 2989 or BS 4921.

15.6 Wire

Galvanized wire should be soft galvanized in accordance with BS 443.

Stainless steel wire should be soft and should comply with BS 1554.

15.7 Fixing blocks in solid backgrounds

Only dovetailed shaped blocks which can be cast in should be considered. Wooden blocks should not be used. Some types of plastics, e.g. high density polyethylene, and some cement-based blocks have proved satisfactory.

15.8 Plugs

Plugs for inserting into pre-drilled holes and to receive screws are available as proprietary products made from jute fibre or various types of plastics. Wooden plugs should not be used.

NOTE It is recommended that those responsible for the rendering satisfy themselves on the adequacy of any method of fixing before commencing work (see clauses 3 and 4).

16 Furring

Firrings should consist of galvanized or stainless steel channels, rods or strips of timber. Rods or strips should be not less than 6 mm thick. Galvanizing should be in accordance with BS 729. Timber should have been given preservative treatment (see 38.7.3).

Section 3. Design

17 Factors influencing the design of the rendering system

17.1 Choice of rendering mixes

This will depend upon the appearance desired, exposure conditions, nature of the background and the functional requirements. These factors should therefore receive consideration together. Experience has shown that a porous rendering not stronger than required for adequate durability and with an open or rough textured finish is likely to give the best results in the majority of circumstances.

Problems can occur with mixes that are too strong. Successive render coats should be specified as being no stronger than the previous coat or background, and no thicker than the previous coat, except in the case of a single coat (see clauses 27, 31 and 32).

17.2 Provision of joints

Consideration should be given to the provision and location of movement joints and day joints in large areas of background and rendering (see clause 27). Except at movement joints, straight vertical joints in masonry should be avoided.

17.3 Preparation of background

The method adopted will be dictated by the type of background. Consideration should be given to the method of forming a key and to any materials to be used, including metal lathing. Consideration should also be given to the fixing of any devices to be built into, or attached to, the background for support.

17.4 Detailing of architectural features

Proper detailing of items such as sills, copings, eaves and verges, string courses, damp-proof courses, flashings, plinths and bellcasts have considerable bearing upon the durability of the rendering.

In order to minimize damage to the rendering, consideration should be given to fixings, for rainwater, soft and vent pipes, etc., being installed before rendering commences. The pipes themselves should be fixed after the wall has been rendered (see Figure 1).

18 Conditions of exposure

Rendering is affected to a greater or lesser degree by the combined action of frost, wind, sun and rain, and their effects will depend to some extent upon the degree of exposure. Altitude, locality and environment will have a bearing on the severity of frost. A classification of exposure to local wind-driven rain is given in Table 10 of BS 5628-3:1985. This table defines exposure categories in terms of the local spell index as described in DD 93 and in terms of exposure categories: severe; moderate and sheltered. These three exposure categories are broader than those derived from DD 93, but generally will be adequate for the purposes of external renderings. The degree of exposure to wind and rain may be assessed by the use of the "driving-rain index" and the direction of the prevailing weather can be judged by the "driving-rain roses" (see Figure 2 and Figure 3). Even so, the designer should always take into consideration local knowledge and experience when deciding which exposure category is the most appropriate.

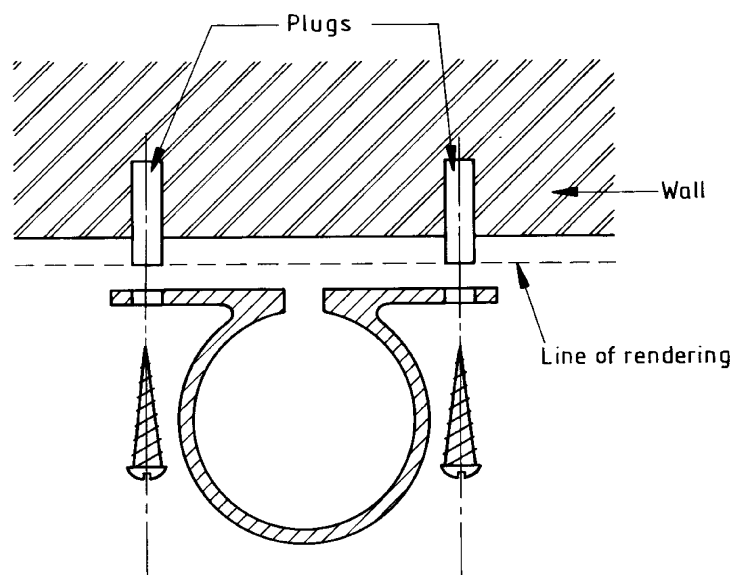
The categories of exposure can be described broadly as follows:

- a) *severe conditions*: exposure to the full force of wind and rain. Applies to buildings on hill sites and near the coast, and buildings projecting well above surrounding buildings in built-up areas;
- b) *moderate conditions*: walls are partially protected from the weather by overhanging eaves and by other buildings of similar height in the neighbourhood. Applies to buildings in towns and in suburban districts generally;
- c) *sheltered conditions*: districts of moderately low rainfall in which walls are protected from the weather by overhanging eaves and by the close proximity of buildings of similar, or greater heights. Ground and first storeys in towns.

Wherever possible, whatever the conditions of exposure, advantage should be taken of architectural features which protect the rendering (see clause 29). Such protective features become more important as conditions become more severe. Mixes appropriate to these categories of exposure are given in clause 31.

19 Resistance to rain penetration

Rain falling upon a relatively smooth surface with little or no absorption does not distribute itself evenly, but tends to run down the surface in streaks. A rough surface, on the other hand, breaks up the flow and so avoids the concentration of water at any one point.



NOTE. Pipe bracket is shown as an example.

Figure 1 — Fixings installed in wall before rendering

A porous rendering will generally absorb some water falling directly on it and retain this until conditions change and it can evaporate outwards. The denser and more impermeable the rendering, the less water it will retain and the greater hindrance to the evaporation of water which has penetrated to or condensed within the background. For resistance to rain penetration, rough surface texture is normally more effective than a dense and impermeable plain finish.

Water may penetrate either through the pores of a rendering or through cracks or both. The extent of penetration through the pores depends upon the permeability of the various coats, upon the relative suction of the rendering and the background and upon the quantity of water at any one point on the surface.

Where cracks occur, water may enter and find its way between the rendering coats, or between the rendering and the background, or directly into the background. A build-up of moisture has also been known to occur where there is a lack of drainage and/or ventilation in cavities of existing rendered brickwork filled with insulation. The water is liable to cause loss of adhesion, further cracking or complete disintegration of the rendering through either frost action or the action upon the cement of soluble sulphates that may be present in the walling material. Also, it may soak through solid walls and cause dampness, loss of adhesion or disintegration of plasterwork inside.

Exposure conditions, coupled with the amount of protection given to the rendering by projecting features (see clause 29) should be considered in deciding upon the type of rendering, the number of coats and the nature of each coat, subject always to the limitations imposed by the nature of the background.