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BS 8481:2006

BRITISH STANDARD

Design, preparation and application of internal gypsum, cement, cement and lime plastering systems – Specification

ICS 91.180

Confirmed
December 2011

BSI
British Standards

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ISBN 0 580 49184 6

The following BSI references relate to the work on this standard:
Committee reference B/544
Draft for comment 06/30140171 DC

Publication history

First published, September 2006

Amendments issued since publication

Amd. no.	Date	Text affected

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Foreword

Publishing information

This British Standard was published by BSI and came into effect on 29 September 2006. It was prepared by Technical Committee B/544, *Plastering, rendering, dry lining*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard together with BS EN 13914-2 and PD CEN/TR 15123 supersedes BS 5492:1990, which is withdrawn.

Relationship with other publications

BS 8481 is largely based on an amalgamation of two CEN Technical Reports:

- CEN/TR 15124:2005, *Design, preparation and application of internal gypsum plastering systems.*
- CEN/TR 15125:2005, *Design, preparation and application of internal cement and/or lime plastering systems.*

However certain additions and deletions have been made to these texts to make them appropriate to working conditions found in the UK.

Information about this document

Where the guidance for the use of gypsum plastering systems differ from that for plastering systems based on cement, cement and lime, the guidance for the former precedes that for the latter. It is essential that the design clauses are read in conjunction with the clauses on background and preparation.

It is not the function of this standard to assign responsibility for the design and application of any work or actions mentioned within to any specific party. Such responsibility is a matter for other documentation associated with the work, e.g. the contract.

A CEN Technical Report is also available which gives the equivalent information for internal polymer plastering systems:

CEN/TR 15123:2005, *Design, preparation and application of internal polymer plastering systems.*

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

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

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

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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.

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1 Scope

This British Standard specifies the design, preparation and application of plaster based on gypsum, cement, cement and lime, for internal plastering on all types of background used under normal conditions. It includes plastering onto both new and old backgrounds and the maintenance and repair of existing work. It concerns materials, backgrounds, preparation of the surface to be plastered, choice of suitable gypsum, cement, cement and lime plastering systems, methods of application and inspection and testing of plastering.

Recommendations on gypsum, cement, cement and lime plastering mixes with special properties intended to enhance thermal insulation, fire resistance, acoustic insulation and to increase radiation absorption maintenance and repair are also covered.

NOTE Relevant data are summarized in a series of tables.

This standard should be read in conjunction with BS EN 13914-2 especially regarding surface, requirements, flatness, verticality, angularity, types of finish and smoothness which are not dealt with in this standard.

2 Normative references

The following referenced documents are indispensable for the application 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 4027, *Specification for sulfate-resisting Portland cement*

BS EN 197-1, *Cement – Part 1: Composition, specifications and conformity criteria for common cements*

BS EN 413-1, *Masonry cement – Part 1: Composition, specifications and conformity criteria*

BS EN 459-1, *Building lime – Part 1: Definitions, specifications and conformity criteria*

BS EN 934-3, *Admixtures for concrete, mortar and grout – Part 3: Admixtures for masonry mortar – Definitions, requirements, conformity, marking and labelling*

BS EN 998-1:2003, *Specification for mortar for masonry – Part 1: Rendering and plastering mortar*

BS EN 10223-3, *Steel wire and wire products for fences – Part 3: Hexagonal steel wire netting for engineering purposes*

BS EN 10230-1, *Steel wire nails – Part 1: Loose nails for general applications*

BS EN 10244-1, *Steel wire and wire products – Non-ferrous metallic coatings on steel wire – Part 1: General principles*

BS EN 10244-2, *Steel wire and wire products – Non-ferrous metallic coatings on steel wire – Part 2: Zinc or zinc alloy coatings*

BS EN 12878, *Pigments for the colouring of building materials based on cement and/or lime – Specifications and methods of test*

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BS EN 13055-1, *Lightweight aggregates – Part 1: Lightweight aggregates for concrete, mortar and grout*

BS EN 13139, *Aggregates for mortar*

BS EN 13279-1:2005, *Gypsum binders and gypsum plasters – Part 1: Definitions and requirements*

BS EN 13496, *Thermal insulation products for building applications – Determination of the mechanical properties of glass fibre meshes*

BS EN 13658-1, *Metal lath and beads – Definitions, requirements and test methods – Part 1: Internal plastering*

BS EN 13658-2, *Metal lath and beads – Definitions, requirements and test methods – Part 2: External rendering*

BS EN 13914-2:2005, *Design, preparation and application of external rendering and internal plastering – Part 2: Design considerations and essential principles for internal plastering*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS EN 13914-2 and the following apply.

3.1 Plaster definitions

3.1.1 plaster
mixture based on one or more binders, applied while plastic and hardens after application, used to obtain an internal surface finish

NOTE Plaster does not acquire its final characteristics until it has set on the building component.

3.1.2 gypsum plaster
plaster consisting of at least 50% gypsum binder as the principle active binding component

NOTE Additives and aggregates might be added by the manufacturer.

3.1.3 designed mixes
plaster designed and manufactured to fulfil stated properties and subjected test requirements (performance concept)

3.1.4 prescribed mixes
plaster made in predetermined proportions the properties of which are assumed from the stated proportions of the constituents (recipe concept)

3.2 Application definitions

3.2.1 plastering
application of plaster

3.2.2 plaster coat
obtained by application of one or more layers with one or more mixes of the same product

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3.2.3 plastering system
plaster coat or sequence of plaster coats applied to a background, including the possible use of a support and/or reinforcement and/or pre-treatment

3.2.4 one-coat plaster
plaster applied in one-coat which fulfils all the functions of a plastering system

3.2.5 multi-coat plaster
plaster system using a sequence of plaster coats to achieve the required thickness when all operations are completed after the plaster has set but not dry

3.2.6 undercoat
lower plaster coat or plaster coats of a plastering system

3.2.7 final coat
last plaster coat of a multi-coat plastering system

3.2.8 dubbing out
process of filling large localized irregularities in the background, such as hollows, prior to the application of an undercoat

3.3 Background definitions

3.3.1 background
surface of a construction element to which a plastering system is to be applied

3.3.2 key
roughness of a surface which enables plaster to make a bond

3.3.3 support
product attached to the background to which a plaster is applied so that the plastering system is largely independent of the background (e.g. lathing)

3.3.4 reinforcement
material incorporated within a plaster coat to improve resistance to cracking (e.g. mesh)

3.3.5 bonding agent
proprietary material used to provide adhesion of the plastering system to the background where necessary

3.3.6 spatterdash and stipple
pre-treatments to prepare a background for plastering

NOTE Stipple is only used in the form of site plaster.

3.4 Other definitions

3.4.1 efflorescence
formation of crystals on a surface during drying caused by the presence of soluble salts

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3.4.2 crazing
network of short, irregular and very fine surface cracks up to approximately 0.2 mm in width

NOTE Hairline cracks do not impair the function of the plaster and are therefore acceptable to a limited extent.

4 Materials and accessories

4.1 Materials for site-made plasters

4.1.1 Binders

4.1.1.1 Gypsum binders and gypsum plasters

If specified, only gypsum binders and gypsum plaster conforming to BS EN 13279-1 shall be used.

4.1.1.2 Common cements including coloured cement

Where used, common cements, including coloured and pigmented cements, shall conform to the requirements of BS EN 197-1.

NOTE Not all types and classes of cement are suitable for each and every application.

4.1.1.3 Masonry cement

Where used, masonry cement shall conform to the requirements of BS EN 413-1.

4.1.1.4 Sulfate resistant cements

If specified, sulfate resistant cements conforming to BS 4027 shall be used.

4.1.1.5 Building lime

Where used, building lime shall conform to the requirements of BS EN 459-1.

4.1.2 Aggregates

Where used, aggregates with established suitability for use plasters shall be used.

Aggregates shall conform to BS EN 13139 for dense aggregates or BS EN 13055-1 for light aggregates as appropriate.

4.1.3 Admixtures for cement and/or lime based plasters

Where appropriate, admixtures with established suitability for plasters shall be used.

Admixtures conforming to the requirements of BS EN 934-3 shall be used; however, admixtures falling outside the scope of BS EN 934-3 can be used given established usage and shall be applied in accordance with manufacturers' instructions.

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4.1.4 Additions

4.1.4.1 Bonding agents

Bonding agents suitable for the individual application shall be used.

The manufacturers' instructions shall be followed.

4.1.4.2 Pigments

Pigments conforming to BS EN 12878 shall be used however; pigments falling outside the scope of BS EN 12878 can be used given established usage and shall be applied in accordance with manufacturers' instructions.

For both the manufacturers' instructions shall be followed.

4.1.4.3 Fibres

*COMMENTARY ON **4.1.4.3***
Fibres can be used in specialized applications such as restoration work, sprayed plasterings and plasterings on lathing or insulation board.

Only fibres which do not affect the chemical or physical stability of the plaster shall be used.

NOTE Fibres should be compatible with the binder.

4.2 Water

The water shall be of a quality such that it does not adversely affect the plaster.

NOTE 1 Water fit for drinking is suitable for mixes for plastering.

NOTE 2 Attention is drawn to the requirements of BS EN 1008 in cases where water supplies are of doubtful quality.

4.3 Types of cement, cement and lime plasters based on BS EN 998-1

4.3.1 General

*COMMENTARY ON **4.3.1***
Ready mixed cement, cement and lime plasters can be mixed entirely in the factory or partly in the factory and then completed on site. Alternatively plaster can be mixed entirely on site.

4.3.2 Factory made and semi-finished factory made cement, cement and lime plasters

When using mixes based on cement, cement and lime, factory made and semi-finished factory made plasters conforming to BS EN 998-1 shall be used for those parts of the process either wholly or partly carried out in the factory.

*NOTE For those parts of the process for semi-finished factory made plasters completed on site see **4.1** and **4.2**.*

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4.3.3 Site-made cement, cement and lime plasters

4.3.3.1 General

Site-made plasters shall be made from constituents given in **4.1** and **4.2** and mixed in accordance with **10.2** with the correct proportions (see **10.1**).

4.3.3.2 Site-made, designed mixes

*COMMENTARY ON **4.3.3.2***
*Site-made, designed mixes should not be made on site unless the contractor has taken special measures to exercise the necessary degree of control (see Clause **11**).*

4.3.3.3 Site-made, prescribed mixes

Site-made, prescribed mixes shall be made by batching the specified binders and aggregates in appropriate proportions (see Table 6).

NOTE 1 Other than ensuring and checking that these mixes are correctly batched, prescribed mixes are not required to meet any test criteria.

NOTE 2 It should be made clear whether mix proportions are by weight or by volume and whether they are based on the use of dry or damp sand and aggregates.

NOTE 3 Mixes can be made and selected according to their use.

4.4 Reinforcement, lathing and beads

Lathing, reinforcement and beads of whatever type shall be of stainless steel, galvanized steel, aluminium conforming to BS EN 13658-1.

Reinforcement of alkali resistant glass fibre net shall conform to BS EN 13496.

Welded wire mesh reinforcement conforming to BS EN 13658-2 shall be used.

4.5 Fixings

Fixings for lathing and beads such as nails, screws, staples and steel wire shall conform to BS EN 10223-3, BS EN 10230-1, BS EN 10244-1 or BS EN 10244-2.

Fixings for lathing and beads such as nails, screws, staples and steel wire shall be of compatible material.

4.6 Firings

*COMMENTARY ON **4.6***
Firings should consist of galvanized or stainless steel channels, rods, steel wire or timber. Firings made of timber should be given a preservative treatment.

Firings shall be of sufficient size so that the lathing and the plaster applied to the lathing is held rigidly.

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5 Design – factors influencing the selection of gypsum plastering systems

5.1 Functions and properties that might be required

*COMMENTARY ON **5.1***
The function and properties achievable are determined by the choice of gypsum binder and gypsum plaster type.

A gypsum plastering system should fulfil some of the following functions or properties:

- *to even out any small unevenness in the background and provide a flat surface;*
- *to provide a decorative finish or a background for such a finish;*
- *to be vapour permeable;*
- *to have a fire reaction conforming with a local requirement;*
- *to have enhanced strength;*
- *to have enhanced resistance to abrasion.*

Special plasters can provide enhanced properties for the following aspects:

- *to improve the fire resistance of a building element (see **6.2.2**);*
- *to improve the thermal properties of a building element (see **6.3**);*
- *to improve the acoustic properties of a building element (see **6.4**);*
- *to enhance the protection against radiation.*

5.2 Factors influencing the choice of gypsum plaster type or systems

The designer shall undertake a design assessment of all functional and aesthetic aspects of the building before choosing the type of gypsum plaster or system to be applied. As a minimum the assessment shall include the following:

a) type of building (private houses, offices, etc.); purpose of building (flat, school, hospital, office, etc.); uses (e.g. wet room);

b) the characteristics of the background;

c) the ambient and operating conditions;

d) the traditional usage in any particular area;

e) the type of finish required.

5.3 Background

*COMMENTARY ON **5.3***
Where it is necessary to plaster over an existing substrate, there should be sufficient bond strength to support and provide adhesion for the new plaster. For most plaster types adhesion is provided by key and suction from the background.

Where a gypsum plaster coat is applied to cement or cement lime background, it is important that the entire substrate is mature, clean and dry and a proper key provided, otherwise there could be difficulty with decoration due to the migration of alkalis. In extreme cases complete debonding of the gypsum plaster coat can occur.

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An assessment shall be undertaken to determine compatibility between the gypsum plastering and the background. As a minimum the assessment of the background shall include the following checklist.

a) Does the background provide adequate support: strength, rigidity and adequate key and suction for the adhesion of the gypsum plaster?

b) Is masonry fit for purpose?

c) Are boards, slabs and polystyrene fixed securely plastered only when they are dry and dimensionally stable?

d) Has background movement including structural, moisture and thermal movements been minimized?

e) Have defects in the background, e.g. lack of adequate key, weakness, contamination been minimized?

f) Is there adequate suction control?

g) Has efflorescence been minimized?

NOTE Such compatibility is necessary to avoid bond failure between successive coats or between the first gypsum plaster coat and the background.

If any of these inadequate characteristics of the background exist, then other means of providing support and/or additional adhesion shall be used (see Annex A).

Where the background conditions are such that there is a high and/or variable suction a pre-treatment incorporating a primer agent such as a bonding agent shall be used.

Where background conditions are such that there is low key and suction a pre-treatment incorporating a bonding agent shall be used.

6 Characteristics of gypsum plastering systems

6.1 General

*COMMENTARY ON **6.1***
Gypsum plasters have a controlled set. When the setting process is completed, no further movement takes place.

Gypsum plaster, when fully set and dry, is amongst the least troublesome of plaster surfaces in relation to decorative finish. Gypsum plasters can be decorated with most proprietary finishes when dry.

NOTE For multi-coat gypsum plaster systems, it is unnecessary to ensure that thorough drying of one coat has taken place before the application of the following coat, but sufficient strength should have developed.

Gypsum plaster can be used in all areas; however they shall not be used under persistently damp conditions after they have set as this causes weakening and disintegration. Gypsum undercoats shall be scratched to provide a key for subsequent coats.

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6.2 Fire properties

6.2.1 Reaction to fire

*COMMENTARY ON **6.2.1***
Gypsum plasters are classified in Euroclass A1 (no contribution to fire) without testing when they contain less than 1% by weight or volume (whichever is the more onerous) of organic material. If they contain more than 1% by weight or volume of organic material, they should be tested and classified in accordance with BS EN 13501-1.

6.2.2 Fire resistance

*COMMENTARY ON **6.2.2***
Resistance to fire is a property of a system (background and plastering) and not of the product itself.

Chemical composition of gypsum is such that it enhances the fire resistance of a building system in which a gypsum plaster system is used.

When relevant, the fire resistance of a system including gypsum plastering should be tested and classified in accordance with BS EN 13501-2.

The manufacturer declares performance on fire: integrity (E), insulation (I), resistance (R).

6.3 Thermal properties

*COMMENTARY ON **6.3***
Normal plasters do not make a significant contribution to thermal insulation. However, they do provide an effective way of sealing porous surfaces and voids.

*For the calculation, ρ values specified in BS EN 12859:2001, **5.3.2** should be used.*

A gypsum plastering system provides warm walls due to its μ (mu) and λ (lambda). It is considered a hygrothermal regulator. Gypsum plastering systems can reduce condensation effects.

If enhanced thermal insulating properties are required, special plasters with improved thermal insulating properties should be used. However, the design of the whole construction should be assessed and calculations and/or tests made to check that the total component (i.e. masonry wall plus finishes) give the required properties.

Table 1 provides thermal conductivity values of gypsum plaster according to density.

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Table 1 **Thermal conductivity values of gypsum plaster according to density**

ρ	λ**23/50**
600	0.18
700	0.22
800	0.26
900	0.30
1 000	0.34
1 100	0.39
1 200	0.43
1 300	0.47
1 400	0.51
1 500	0.54

ρ = density in kg/m^3.

λ23/50 = gypsum thermal conductivity in W/m.K.

6.4 Acoustic properties

*COMMENTARY ON **6.4***
Even if normal gypsum plasters do not contribute specifically to sound absorption, a gypsum plastering system contributes to sound absorption due to its flexibility (minor critic frequency) and continuity by filling voids. It decreases the reverberation time.

If enhanced sound absorption properties are required, special acoustic plasters should be used.

Sound-absorbent finishes can affect sound transmission indirectly to some extent by reducing the level of reverberant noise in either the source room or receiving room.

6.5 Resistance to cracking

NOTE Gypsum based plasters do not crack by themselves; cracking is usually caused by other factors, e.g. background movement.

*COMMENTARY ON **6.5***
When the background has been erected and the gypsum plastering system prepared and applied in accordance with this standard then the gypsum plastering system should perform satisfactorily.

6.6 Durability

*COMMENTARY ON **6.6***
The durability of gypsum plaster can be affected by the following.

- *Lack of adhesion to the background and between coats.*
- *Alkali migration from the background.*
- *Contamination from the background, e.g. oil, organic films, salts.*
- *Dust on the background.*
- *Incorrect usage.*
- *Persistently high humidity and dampness.*
- *Movement in the structure.*

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6.7 Thickness

6.7.1 General purpose

The nominal and minimum thickness of undercoat within a multi-coat system or a one-coat system shall be specified in accordance with Table 2.

NOTE 1 Bonding agent, spatterdash and stipple do not form a coat in the plastering system.

NOTE 2 Care should be taken that the thicknesses applied should not exceed the manufacturers' recommendations.

Table 2 **Nominal and minimum thickness of undercoat(s) of a multi-coat system or one-coat system**

Thickness	**Nominal** (mm)	**Minimum**[a] (mm)
One-coat or undercoat of a multi-coat system	10	5

[a] The minimum permissible thickness values should be limited to individual points only in all cases of application: undercoat(s) of a multi-coat system or one-coat system.

6.7.2 To plasterboard

*COMMENTARY ON **6.7.2***
A thin gypsum plaster coat can be used on plasterboard. Pre-treatment, such as bonding agents, might be required on certain types of plasterboards. Manufacturers should be consulted.

6.7.3 To solid backgrounds

*COMMENTARY ON **6.7.3***
The thickness of gypsum plaster necessary to enable a flat, true and uniform surface depends on the degree of variation in level, line and suction of the background. Beads assist the finishing of plaster, e.g. at corner or against other materials.

For solid backgrounds, for normal purposes, the thickness values shall be in accordance with Table 2.

*NOTE For ceilings on solid backgrounds see **6.7.1**, Note 1.*

6.7.4 To metal lath

On metal laths the total thickness of finished plasterwork (measured from the front face of the laths) shall be not less than 10 mm for all types of plaster.

6.7.5 Service conduits and ducts

The thickness of gypsum plaster shall be a minimum of 5 mm over the extreme protrusions of any service duct or conduit.

6.8 Surface hardness

*COMMENTARY ON **6.8***
A gypsum plastering system provides good surface hardness and resistance.

If additional surface hardness is required gypsum plaster conforming to BS EN 13279-1:2005, type B7 shall be specified.

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6.9 Application of gypsum plasters

6.9.1 General

*COMMENTARY ON **6.9.1***
Gypsum plaster should be applied by hand using hawk and trowel or by spraying by machine in a continuous process.

Before gypsum plastering starts, environmental conditions shall be determined. The surface to be plastered shall be free of frost.

NOTE 1 The background temperature should be at least 5 °C.

NOTE 2 The gypsum plaster should not be subjected to temperatures below 5 °C before it has set.

NOTE 3 At higher temperatures care should be taken to avoid drying before setting.

Before plastering, the building shall be weather tight.

Backgrounds shall not be plastered until sufficient time has been allowed for them to dry out (particularly important for concrete backgrounds). Backgrounds shall be examined for contamination, structural integrity, key, suction and strength.

Any organic growth or efflorescence on the wall shall be removed.

NOTE 4 On new work, designed to be plastered, the removal of all dust, loose material and any contamination such as splashes of oil or plaster might be all that is needed.

Walls that have previously been painted shall not be plastered unless all traces of paint are first removed or other special precautions have been taken.

NOTE 5 Before any plastering is begun all cutting back and drilling for fixing and supports for services should preferably be completed.

Structural movement joints shall be clearly identified and shall not be plastered over.

NOTE 6 The amount of suction can be judged by splashing the clean wall with water.

6.9.2 Storage

There shall be adequate and appropriate storage for plant and materials on site.

6.9.3 Preparation of gypsum plaster

*COMMENTARY ON **6.9.3***
*Gypsum plaster for manual application should be mixed with clean water (see **4.2**) by hand or mechanically. Gypsum plaster for mechanical application should be mixed with clean water in a machine specially designed for the application of gypsum plaster.*

The manufacturers' instructions shall be followed.

6.9.4 Drying time

*COMMENTARY ON **7.4***
Gypsum plastering should be ventilated until it has dried. Drying time depends on the thickness of the gypsum plaster, the moisture and the ventilation of the building.

The gypsum plaster should be dry prior to decoration. Paint should be selected and applied in accordance with the paint manufacturers' recommendations.

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7 Design – factors influencing the selection of cement, cement and lime plastering systems

7.1 Functions and properties that might be required

*COMMENTARY ON **7.1***
The function and properties achievable are determined by the choice of cement, cement and lime type and mixes.

Cement, cement and lime plastering systems should fulfil some of the following functions or properties:

- *to even out any small unevenness in the background and provide a flat surface;*
- *to provide a decorative finish or a background for such a finish;*
- *to have enhanced strength;*
- *to have enhanced resistance to abrasion.*

Special plasters can provide enhanced properties for the following aspects:

- *to improve the thermal properties of a building element (see **6.3**);*
- *to enhance the protection against water penetration;*
- *to enhance the protection against soluble salts and moisture (renovation plaster).*

7.2 Factors influencing the choice of cement and cement and lime plaster type or systems

The designer shall undertake a design assessment of all the functional and aesthetic aspects of the building detailed in **5.2** a) to e) except that this is for cement, and cement and lime plasters rather than for gypsum plasters.

7.3 Background

The background commentary, recommendations and requirements of gypsum based plastering systems (see **5.3**) shall also apply to cement, cement and lime plaster systems.

8 Characteristics of cement, cement and lime plastering systems

8.1 General

8.1.1 Cement, cement and lime plasters

*COMMENTARY ON **8.1.1***
Cement, cement and lime plasters have a controlled set. During the drying out process, shrinkage might take place depending on the materials of the plaster mix. Cement, cement and lime plasters can be decorated with most proprietary finishes when dry.

The appropriate cement, cement and lime plaster can be used in most areas. Plasters for special designed requirements are described in BS EN 998-1.

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Cement, cement and lime undercoats shall be scratched to provide a key for subsequent coats. Each undercoat shall be allowed to harden and dry before applying the subsequent coat.

8.1.2 Lightweight cement and cement/lime plasters

*COMMENTARY ON **8.1.2***
*Lightweight cement plasters have the general characteristics as described in **6.1** but are less brittle.*

8.1.3 Damp conditions

NOTE Cement and cement/lime plasters can be used in damp conditions.

8.1.4 Impact and abrasion resistance

*COMMENTARY ON **8.1.4***
Plasters conforming to BS EN 998-1:2003, classes CS III and CS IV are suitable for use where a high level of impact and abrasion resistance is required.

*NOTE See BS EN 13914-2:2005, **4.2.6** for additional information.*

8.2 Reaction to fire

*NOTE 1 See **6.2.1** for information on reaction to fire.*

NOTE 2 Attention is drawn to the Commission Decision 96/603/EC, as amended, in which non-combustible plaster containing not more than a mass or volume fraction of 1.0% (whichever is the more onerous) of homogenously distributed organic materials are classified as reaction to fire Class A1 without testing.

8.3 Thermal insulation

*COMMENTARY ON **9.5***
Only a suitable final plaster coat should be used on thermal insulating cement/lime plaster undercoats.

The thermal insulating plaster might have one of two ranges of compressive strength as given in BS EN 998-1:2003, Table 2.

The strength of the final coat shall conform to the requirements of BS EN 998-1:2003, Table 2.

NOTE 1 The nominal thickness of the undercoat(s) should be in the range of 20 mm (minimum) to 100 mm and that of the final coat(s) approximately 10 mm.

*NOTE 2 See BS EN 13914-2:2005, **4.3** for additional information.*

8.4 Acoustic properties

*COMMENTARY ON **9.6***
Cement, cement and lime plasters do not contribute to sound absorption but they can contribute to the continuity by avoiding phonic bridges. If special properties are required, then special acoustic plasters should be used. Sound-absorbent finishes can affect sound transmission indirectly to some extent by reducing the level of reverberant noise in either the source room or receiving room.

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8.5 Resistance to cracking and crazing

*NOTE 1 See the commentary given in **6.5** except that this is for cement and cement and lime plasters whereas this is for gypsum plasters.*

NOTE 2 Smooth final coat plasters are prone to crazing.

8.6 Durability

*COMMENTARY ON **9.8***
The durability of cement, cement and lime based plaster can be affected by the following.

- *Lack of adhesion to the background and between coats.*
- *Alkali migration from the background.*
- *Contamination from the background, e.g. oil, organic films, salts.*
- *Dust on the background.*
- *Movement in the structure.*
- *Incorrect usage, e.g. over a gypsum plaster.*
- *Persistent high humidity and dampness.*

Crazing does not impair the performance of the plaster. It consists of micro-fissures which are caused by differential shrinkage of the plaster surface.

8.7 Principles governing the number of plaster coats

*COMMENTARY ON **8.7***
The thickness that can be applied in one operation depends upon the type of plaster chosen.

Dubbing out is not included as a coat in the system neither should its thickness be included in the thickness of the plastering system.

The nature of the background and degree of accuracy of the finished surface required by the specification determines the number and thickness of plastering coats.

*The thickness, trueness and verticality of the plastering system is detailed in **6.6** and **6.7** and BS EN 13914-2.*

Brickwork and blockwork if constructed to a close enough tolerance, allows single or multi-coat work depending upon the tolerance of the background and the thickness of the coats applied. If brickwork and blockwork is erected in accordance with the recommendations of DD ENV 1996-2, they might not have sufficiently true and vertical surfaces to allow the use of a thin one-coat plaster or a single undercoat.

In-situ concrete and some specially made units and constructed walls having a sufficiently true and vertical surface and uniform suction might be suitable for single-coat work.

*The thickness of plaster applied to a solid soffit should be kept to a practical minimum to avoid the risk of detachment (see also **6.7.3** and Table 2 and Table 3).*

8.8 Thickness of plaster coats

8.8.1 General

NOTE 1 Care should be taken when using thicknesses greater than those given in the tables and either manufacturers' advice should be followed or a multi-coat system used.

NOTE 2 Spatterdash and stipple do not form a coat in the plastering system.

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8.8.2 To solid backgrounds

*COMMENTARY ON **8.8.2***
The general range of total thicknesses for plasterwork to solid backgrounds is given in Tables 1 and 2 for one-coat systems and Tables 2 to 4 for two coat systems. The values given are exclusive of keys.

*The thickness of plaster applied to a soffit should not exceed 15 mm to avoid any risk of detachment. When the thickness is over 15 mm, special precautions should be taken (see **6.7**).*

Table 3 **Recommended thicknesses for various types of one-coat cement, cement and lime plasters to solid backgrounds**

Binder base of plaster	**Recommended range for application of plaster thickness** (mm)						
	Plaster types						
	General purpose		**Lightweight (LW)**		**Renovation (R)**	**Thin**	
	Nominal	**Minimum[a]**	**Nominal**	**Minimum[a]**	**Range**	**Nominal**	**Minimum[a]**
Cement/lime	10	5	10	5	>20, <30	–	–
Cement	10	5	10	5	>20, <30	–	–
Polymer modified cement lime	6	2	6	2	–	3	1

Values for soffits should be as for Table 3 but with a maximum of 15 mm for keyed surfaces and 10 mm for smooth surfaces.

[a] The minimum permissible thickness values should be limited to individual points only. For site plasters these values might need to be increased.

NOTE In some areas, for instance due to unevenness of the background the thickness of plaster might be reduced by up to 5 mm from the values given.

Table 4 **Recommended total thicknesses for multi-coat systems consisting of cement, and cement and lime plasters onto solid walls and soffits (the underside of floor slabs)**

Binder base and plaster type		**Recommended range for application of total plaster thickness** (mm)			
Undercoat	**Final coat**	**Walls**		**Soffits**	
		Nominal	**Minimum[a]**	**Nominal**	**Minimum[a]**
Cement/lime (GP)[b]	Cement/lime (GP)[b]	12	7	10	5
	Polymer modified cement/lime				
	Gypsum (GP)[b]				
Cement (GP)[b]	Cement (GP)[b]	12	7	10	5
	Gypsum (GP)[b]				
	Polymer modified cement				

NOTE In some areas, for instance due to unevenness of the background the thickness of plaster might be reduced by up to 5 mm from the values given.

[a] The minimum permissible thickness values should be limited to individual points only.
[b] GP – General purpose.

8.8.3 To metal lath

The requirements of **6.7.4** shall apply.

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8.8.4 Service conduits and ducts

The requirements of **6.7.5** shall apply.

8.9 Surface hardness

NOTE A cement, cement and lime plastering system provides a good surface hardness and resistance.

9 Backgrounds, including preparation for cement, cement and lime plastering systems

9.1 Required characteristics of the background

9.1.1 General

Where precautions are necessary when preparing backgrounds the requirements of **9.2, 9.3** and Annex A shall be followed.

9.1.2 Strength

It shall be ascertained that the background has adequate strength with sufficient load bearing capacity and be sufficiently resistant to deformation.

NOTE Backgrounds should be no weaker and preferably slightly stronger than the plastering.

9.1.3 Movements

*COMMENTARY ON **9.1.3***
Movements of backgrounds, including structural, moisture or temperature should be minimized. Such movements lead to stresses such as shrinking when changes occur in the background and/or plastering system.

9.1.4 Surface dryness, cleanliness and previous coatings

*COMMENTARY ON **9.1.4***
Where it is necessary to plaster over an existing coating, care should be taken that it has sufficient bond strength, to support and provide adhesion to the new plaster. For most plaster types adhesion is provided by key and suction from the background.

The background shall be visually inspected to ensure it is sufficiently dry and free of dust and contamination.

9.1.5 Porosity and suction

*COMMENTARY ON **9.1.5***
When backgrounds are likely to have non-uniform suction properties special precautions should be taken. The porosity and suction of the background influences the need for a pre-treatment, e.g. a bonding agent or primer to reduce suction.

The designer shall include clear information on suction properties of the background and its pre-treatment in the specification.

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9.1.6 Bond

It shall be ascertained that the background is capable of providing adequate bond to support the full weight of the plaster system and applied finishes.

9.1.7 Soluble salts and efflorescence

When necessary the background surface shall be cleaned to ensure it is free of efflorescence.

9.1.8 Flatness and verticality of construction

The background surface shall be built to a sufficiently true line to allow the final plaster surface to be applied to the tolerance required.

*NOTE See BS EN 13914-2:2005, **4.9** for further information.*

9.1.9 Unfrozen

The background surface shall be free of frost.

The ambient temperature shall be above 5 °C.

9.2 Classes and types of backgrounds

9.2.1 General

In choosing the plaster type, the characteristics of the background shall be ascertained (see **4.1.5**, Table 6 and BS EN 13914-2:2005, **4.1.3**). For factory made plasters the type of cement or cement/lime plaster shall be chosen taking into account the background strength, key/texture and suction.

For site-made and factory made plasters proportions shall be chosen so that they are compatible and less strong than the background. Care shall be taken when backgrounds have high or variable porosity/suction (see **5.3**).

*NOTE 1 For repair and renovation work, see Clause **11** and Annex B.*

NOTE 2 For backgrounds made of concrete, calcium silicate or woodwool, consideration should be given to the possibility of drying shrinkage, and hence their age and moisture content as appropriate.

NOTE 3 For backgrounds made of polystyrene the effects of shrinkage and age should be ascertained.

NOTE 4 Boards and slabs should be fixed securely and only when they are dry and dimensionally stable can they be plastered.

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Table 5 **Recommended pre-treatments for various cement, cement and lime plastering systems and for various backgrounds**

Background	**Cement and cement/lime**	
	Cement or cement/lime undercoat	**One-coat cement or cement lime**
Rough dense concrete	B/C	B/C
Smooth dense concrete	E	E
Dense concrete masonry	B/C	B/C
Lightweight concrete masonry	A,F,G	A,F
Autoclaved aerated concrete masonry	D,F,G	D,F
Clay brickwork	A	A
Dense clay brickwork	E	E
Lightweight clay brickwork	A,G,F	A,G,F
Calcium silicate brickwork	B/C	B/C
Metal lathing	F,G	F

A – Normally satisfactory except where product specific (i.e. background material) treatment is required.

B – Pre-treatment is required depending on condition of background using cement or cement/lime and aggregate and polymer. Sufficient drying time important when gypsum plaster is used.

C – Pre-treatment is required depending on condition of background using cement or cement/lime and aggregate.

D – Pre-treatment is required depending on condition of background using a suction reducing agent.

E – As C but is required on all backgrounds using cement or cement/lime and aggregate and polymer.

F – Care should be taken in the choice of cement plaster type and cement/lime plaster type (factory made plasters).

G – Care should be taken in the choice of mix to give correct strength relative to background (site-made plasters).

9.2.2 Concrete backgrounds

*COMMENTARY ON **9.2.2***
Dense concrete, because of its lack of absorbency, does not afford a satisfactory bond for plasters unless it is textured.

Special measures shall be taken when working on concrete backgrounds to ensure an adequate bond, e.g. use of a bonding agent.

9.3 Bonding pre-treatment for use with cement, cement and lime, based plasters

9.3.1 General

*COMMENTARY ON **9.3.1***
When using factory made plasters it is not always necessary to use a pre-treatment on rough, high suction backgrounds. For site-made and semi finished plasters it might be necessary to use a spatterdash or stipple pre-treatment when plastering onto smooth, dense surfaces in order to provide an effective textured key.

9.3.2 Spatterdash and stipple

9.3.2.1 Site-made mix for spatterdash (see system C of Table 5)

Site-made mix for spatterdash shall consist of cement and clean coarse sand, possibly with a small amount of lime.

NOTE 1 A bonding agent can be incorporated in the mix.

NOTE 2 In very warm weather the surface might need to be lightly dampened periodically until the spatterdash has hardened and then be allowed to dry.

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9.3.2.2 Site-made mix for stipple (see systems B and E of Table 5)

Site-made mix for stipple consists of the same materials as spatterdash (see **9.3.2.1**) but a bonding agent shall always be used.

*NOTE Curing and checking should be the same as for spatterdash (see **9.3.2.1,** Note 2).*

9.3.2.3 Factory-made spatterdash (see system C of Table 5)

Factory-made spatterdash shall be applied in accordance with the manufacturers' instructions.

9.3.2.4 Special factory made plasters incorporating bonding agents (see systems B and C of Table 5)

*COMMENTARY ON **9.3.2.4***
Adhesion to smooth backgrounds (e.g. concrete and brickwork) can be enhanced by spray applying special factory made plasters incorporating bonding agents (using a trowel with a serrated edge) for between one to three days before applying the undercoat.

9.4 Preparation of background

9.4.1 General

Backgrounds to be plastered shall be examined for contamination, key, suction and strength.

NOTE 1 The recommendations for various types of new background are given in Table 5.

Walls that have previously been painted shall be carefully examined and any necessary measures taken before plastering.

Where a movement joint occurs in the background an equivalent movement joint shall be provided in the plastering at the same location.

NOTE 2 The background can be judged by visual examination, wetting, scratching, and/or by the wiping test.

9.4.2 Preparatory pre-treatment

*COMMENTARY ON **9.4.2***
Smooth, dense surfaces can be provided with a suitable key or splatterdash by applying a preparatory pre-treatment. The type of preparatory pre-treatment varies according to the type of plaster to be used, and the type of background to be plastered. The recommended pre-treatments are given in Table 5.

Backgrounds should have uniform suction properties. Therefore it might be necessary to apply a primer to reduce suction, e.g. system D as specified in Table 5.

Bonding agent with mineral bonding mortar and the addition of a polymer dispersion can be used for a cement lime plaster.

9.4.3 Treatment of mixed backgrounds

Suitable measures shall be taken where plastering is to be continued across backgrounds of different materials, e.g. concrete abutting masonry.

NOTE The type of measure, e.g. joints or support depends on the individual situation.

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10 Preparation and application of cement, cement and lime plasters

10.1 Proportioning of mix materials on site

10.1.1 General

Mix proportions suitable for plastering shall be as given in Table 6.

Table 6 **Mixes suitable for plastering**

Mix designation	**Mix proportions by volume based on damp sand**				
	Cement:lime: sand[a]	**Cement:ready-mixed lime:sand**[a]		**Cement:sand**[a] **(using plasticizer)**	**Masonry cement:sand**[a]
		Ready-mixed lime:sand	Cement:ready mixed material		
I	1:¼:3	1:12	1:3	–	–
II	1:½:4 to 4½	1:9	1:4 to 4½	1:3 to 4	1:2½ to 3½
III	1:1:5 to 6	1:6	1:5 to 6	1:5 to 6	1:4 to 5
IV	1:2:8 to 9	1:4½	1:8 to 9	1:7 to 8	1:5½ to 6½
V	1:3:10 to 12	1:4	1:10 to 12	–	–

NOTE In special circumstances, e.g. where soluble salts in the background are likely to cause problems, mixes based on sulfate-resisting Portland cement should be employed.

[a] With fine or poorly graded sands, the lower volume of sand should be used.

10.1.2 Prescribed mixes

NOTE Prescribed mixes are usually proportioned by volume.

10.1.3 Designed mixes

NOTE Designed mixes should be proportioned by volume or by weight depending upon which method is used in the design.

10.1.4 Volume batching

*COMMENTARY ON **10.1.4***
The mix proportions given should state whether they are based on volume proportions and whether the sand is in the damp or dry condition. Adjustments might need to be made to the volume of the sand used, depending upon its condition, to allow for bulking when wet. If a harsh sand is being used together with dry hydrated lime, the proportions of lime can be increased. Alternatively by agreement, a plasticizer can be incorporated as an alternative to the lime in a cement/lime mix.

Volume batching shall be carried out using properly constructed volume measuring boxes. Admixtures shall be dispensed accurately.

10.1.5 Weigh batching

The proportions shall be batched by weight according to the weights given or the weight proportions specified.

NOTE Depending upon whether the design given was based upon the use of dry or damp sand, a correction to the batch weight of the sand might need to be made.

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10.2 Mixing on site – for factory made and site batched plasters

*COMMENTARY ON **10.2***
Designed mixes which have been weigh batched should normally be mixed by machine. Other plaster mixes should preferably be mixed by machine. Thorough mixing is more easily achieved by mechanical means.

The various constituents shall be added to the mixing process in the correct sequence and quantities to achieve optimum mixing action. Mixing shall continue until the materials are workable and of a uniform colour and consistency.

10.3 Application

10.3.1 General

Plaster shall be applied at a uniform consistency, either by machine or by hand. It can be applied as a one-coat or a multi-coat system.

10.3.2 Dubbing out

*COMMENTARY ON **10.3.2***
If the background is of an uneven line with localized hollows then dubbing out might be required. The method of working depends upon the depth and area of the hollow, the type of background and the plaster to be used.

10.3.3 One-coat system

The background shall be inspected to determine if it has adequate properties (see **9.1**) and if a pre-treatment is required (see Table 5). If a pre-treatment is required and it is not included in the specification then the designer shall be notified [see BS EN 13914-2:2005, **3.1** a)].

NOTE A one-coat system can be applied in multiple passes by wet on wet. It can be finished as follows:

a) with a wood float;

b) with a wood float and lightly trowelled with a steel trowel;

*c) felted finished in another selected manner (see Clause **8**) depending upon the composition of the plaster.*

10.3.4 Multi-coat system

10.3.4.1 General

The requirements and recommendation of **10.3.3** shall apply to the first coat of a multi-coat system. The surface of a preceding coat shall be prepared to present a suitable key to assist bonding with a subsequent coat. Each undercoat should be allowed to harden and dry before applying the subsequent coat.

NOTE Difficulty in application can sometimes be experienced when plastering on high-suction backgrounds due to rapid moisture loss from the plaster. Special measures are required to remedy this problem (e.g., bonding agent, primer to reduce suction, or use of an additive).

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10.3.4.2 Final coat

*COMMENTARY ON **10.3.4.2***
The period of time between completion of the undercoat and the application of the final coat depends on the choice of product, the ambient conditions, the suction of the background and the thickness of the previous coat. In general no recommendation can be given for the minimum period of time between completion of the undercoat and the application of the final coat, although it is likely to be at least several days.

The final coat provides a flat surface, but due to the presence of aggregates a smooth finish cannot be achieved.

11 Maintenance and repair (other than restoration of old and historic buildings)

11.1 General

*COMMENTARY ON **11.1***
*Clause **11** gives recommendations for the maintenance and repair of plaster, where e.g. the plaster or the building structures are made of materials and techniques that are similar to those used in current construction. Generally the principles and recommendations given in the previous clauses apply except where advised otherwise here.*

The mix proportions, colour and texture of site-made plasters should be matched as closely as possible to the existing work. For site-made plasters the sand for the mix should be carefully selected.

It is recommended to prepare small test panels and leave them to dry thoroughly before comparisons are made and the mix decided upon.

For restoration and/or conservation of older work using different types of materials and techniques refer to Annex B.

11.2 Inspection

*COMMENTARY ON **11.2***
The nature and extent of the defects should be ascertained by someone knowledgeable and experienced in the subject.

It is important to ascertain the basic cause of the defects especially where they are due to inappropriate design or deficiencies in the background.

11.3 Efflorescence

*COMMENTARY ON **11.3***
Efflorescence is caused by the presence of soluble salts such as sulfates, nitrates and chlorides, of sodium and magnesium in the background, and the presence of sufficient water to carry these to the surface as the structure dries.

To overcome efflorescence, all sources of moisture should be removed. The contaminated plaster should be removed over an area of approximately 1 m surrounding the affected areas.

Any salts on the background surface shall be removed by dry method and the joints raked.

*NOTE When this has been done a renovation plaster can be applied or other measures taken, e.g. provision of a new background (see **9.2**).*

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11.4 Repairs to cracks

11.4.1 General

*COMMENTARY ON **11.4.1***
The method employed when repairing cracks depends upon the width and depth of the crack. Therefore the crack should be inspected before the appropriate remedial action is commenced.

11.4.2 Repairs to fine cracks and crazing in plasterwork only

*COMMENTARY ON **12.4.2***
Fine cracks and crazing in plasterwork should be filled with purpose made filler and redecorated.

11.4.3 Repairs to wider cracks in plasterwork only

*COMMENTARY ON **11.4.3***
Wider cracks in plasterwork, if not accompanied by loss of adhesion can normally be repaired by raking them out to slightly widen them and filling the gap.

*If accompanied by lack of bond, see also **11.5.2**.*

11.4.4 Repairs to cracks in plasterwork and background

*COMMENTARY ON **11.4.4***
The cause of the crack should be identified and rectified prior to making the repair.

If the background cannot be effectively remedied, special measures should be taken in each case. The repair of cracks depends on each individual case.

11.5 Repair of hollow or detached areas and textured finishes

11.5.1 General

NOTE Loss of adhesion can arise from various causes and it is essential that the cause of this should be dealt with before repair.

11.5.2 Plastered finish only

*COMMENTARY ON **11.5.2***
When the causes of failure have been established and resolved, the patches of damaged plastering should be corrected professionally. It is not possible to completely match the surface of a new repair with an existing plaster surface.

11.5.3 Textured finishes

*COMMENTARY ON **11.5.3***
The texture of the repair plaster to the existing plaster should be matched as closely as possible although it is generally impossible to achieve a perfect match.

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Annex A (normative) Fixing applied backgrounds

A.1 Metal lath support

A.1.1 Fixings

The fixings for metal lath shall be compatible with the material of the lath.

Fixings shall be of corrosion-resistant material.

Fixings shall be of adequate size for the weight to be supported and the type of firing or structure on which the metal lath is to be fixed. The fixing heads shall be of sufficient size to prevent pull-through.

The fixings and overlaps shall meet the fire resistance criteria of the application for which they are used.

The manufacturers' installation specifications shall be followed.

A.1.2 Fixing for all types of lath

The type of support and the fixing centres shall be chosen taking into account the type and grade of the lathing and the weight to be supported, so that the lathing is held rigidly.

The laths shall be fixed with the stiffening ribs or wires running at right angles to the support.

In mixed backgrounds of masonry and timber or masonry and steel where possible, laths shall be fixed to the masonry.

The lath shall be fixed to any other ground (concrete or masonry) using appropriate fixings such as plugs, screws, but with regard to any requirements for fire and corrosion resistance.

The maximum span between the support depends on the type of lath used, but shall not exceed 700 mm for walls and 450 mm for ceilings.

The lath shall always be fixed in a staggered pattern.

The number of fixings to the support depends on the type of lath, but the distance between the fixing to the support shall be max 150 mm.

The laths shall be lapped at all sides not less than 100 mm in horizontal and vertical direction. The ribs, where present, shall be nested and fixed together.

Where end laps occur between supports, the lath shall be lapped not less than 100 mm and the laths should be rigidly tied together on all sides.

A.2 Metallic mesh for reinforcement

A.2.1 Fixings

Metallic mesh fixings shall be of corrosion-resistant materials (see **4.5**), which are compatible with the material of the mesh. Fixings shall be of adequate size for the weight to be supported. The fixings shall allow a maximum distance between the metallic reinforcement and the background.

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A.2.2 Metallic mesh on solid backgrounds

The metallic mesh type to be used as reinforcement on solid backgrounds shall be fixed to the background with appropriate fixings.

NOTE The number of fixings depends on the type of mesh.

Metallic mesh shall be embedded in the outer half of the overall thickness of the plaster. Metallic mesh shall be lapped in all directions with not less than 100 mm overlap.

A.3 Beads and temporary formwork

*COMMENTARY ON **A.3***
Beads should be fixed to line before plastering.

Formwork is temporarily fixed to openings and frames instead of beads in order to facilitate the use of clip-on frames [see Figure A.1 a)].

*When using prefabricated metal door frames without reveals or returns [see Figure A.1 b)], no additional beads are necessary (see also BS EN 13914-2:2005, **4.8.2**).*

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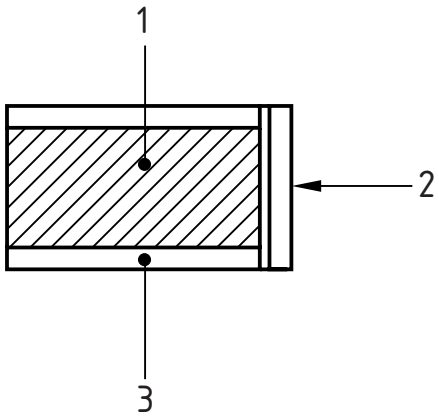
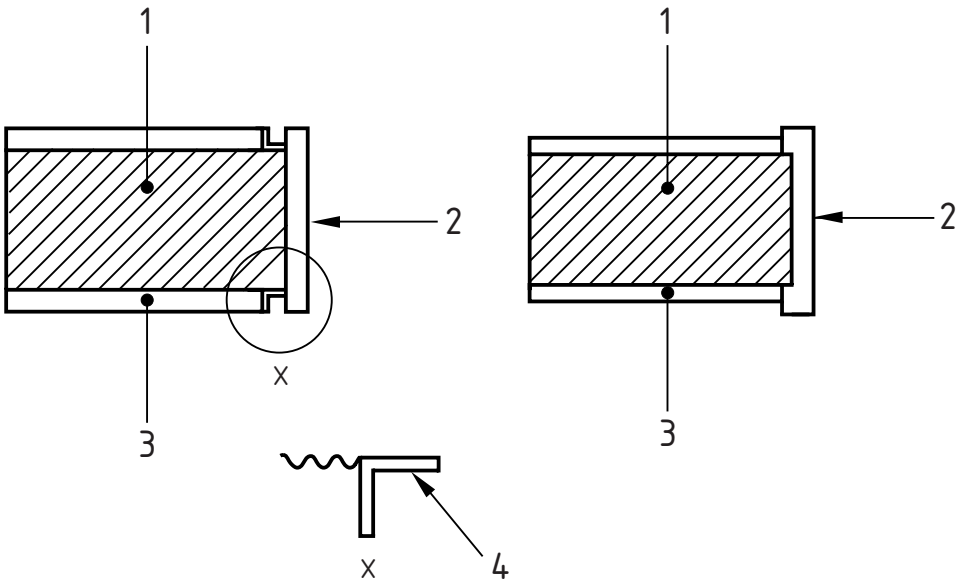
Figure A.1 **Typical applications of metal beads and temporary formwork around openings**



a) Temporary formwork at opening prior to fitting clip-on frames



b) Prefabricated metal doorsets

Key

1 Plaster
2 Temporary formwork
3 Wall
4 Architrave bead

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Annex B (informative) Restoration of plasters on old and historic buildings

B.1 General

Annex B gives recommendations for the renovation and repair of defective plasters on old or historic buildings where the types of materials and techniques used are often different to those in modern buildings. Generally the principles and recommendations given in the previous clauses of this standard apply except where advised otherwise here.

As the range of backgrounds, types of plasters and their constituent materials have varied greatly throughout the UK over the centuries, the recommendations given here are mostly of a general nature. The advice of experts practising in the type of work involved should always be sought.

Designers, applicators and others involved should work in close co-operation and with any authority, if involved. Before undertaking such work, the causes of deterioration should be established and the existing materials identified so that materials with similar properties can be used in the repair.

Depending upon the condition of the background as revealed from the investigation, it might be necessary to stabilize or damp proof it prior to plastering. Such treatment can take a considerable time to dry out before plastering can start. Further time should be allowed for the plaster to dry out, prior to painting. This drying period can be reduced by using a renovation plaster complying with BS EN 998-1, but manufacturers' recommendations should be followed.

B.2 Preliminary investigations

B.2.1 General

Preliminary investigations should be made to establish the cause of the need for restoration, the extent of the repairs required and any historical factors.

B.2.2 Diagnosis of cause

B.2.2.1 General

Causes often relate to dampness or soluble salts. These causes should be investigated first, together with an assessment as to any other causes of decay.

B.2.2.2 Causes of dampness in walls

Dampness in walls might be caused by the following:

- contact with ground water or moisture;
- capillary water absorption in the upward direction;
- water ingress through incorrect detailing;
- humidity exchange with the atmosphere;

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- from within the building as condensed water vapour;
- leaking services.

The level to which general dampness rises in a wall is determined by these factors. It is exacerbated by the presence of soluble salts.

B.2.2.3 Source and degree of dampness

Before commencing any remedial treatment for dampness a proper diagnostic process should be undertaken which should include the following:

a) the collection of general data;

b) a visual survey of the features of the place and soil, identification of materials of construction, mapping of dampness in the structure;

c) identification of possible causes correlated to how and when the moisture appears (see **B.2.2.2**);

d) measurements from samples, giving sample collection positions and indication of instruments used, together with the following parameters:

   1) water content of the masonry, including assessment of rising damp, e.g. by using calcium carbide system or weight measurement. Rising damp measurements cannot be made until other sources of damp have either been quantified or eliminated;

   2) relative humidity of the air, air temperature and wall surface temperature;

   3) qualitative and quantitative analysis of soluble salts in the background.

B.2.2.4 Soluble salts in the background

As part of the investigation the extent, type and concentration of any potentially deleterious salts should be established. In some cases it is necessary to monitor salt and moisture content of the masonry over a period of time to identify the source and develop appropriate remedial treatments.

B.2.2.5 Other causes of decay

To establish other causes of decay there should be an assessment of building movements and causes of cracking (see BS EN 13914-2:2005, **4.2.5**), frost damage, erosion, chemical analysis and geological investigation.

B.2.3 Historical investigation

With buildings of historical merit information should be collected on the typical materials used during the period of the building. Measurements, photographs and possible moulds of specific features might be needed to faithfully reproduce the original appearance.

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B.3 Preparatory work

Prior to undertaking the renovation of the plastering, the following preparatory work should be completed as required:

- improvement of details to prevent water entering at sills, parapets, etc.;
- providing physical or chemical damp proof courses; and
- other measures to allow the evaporation of water from the wall.

It might be necessary to allow the wall to dry and stabilize for many months or even years before it is suitable for the plastering restoration to be undertaken. This time period can be reduced by using a porous plastering system.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS EN 1008, *Mixing water for concrete – Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete*

BS EN 12859:2001, *Gypsum blocks – Definitions, requirements and test methods*

BS EN 13501-1, *Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests*

BS EN 13501-2, *Fire classification of construction products and building elements – Part 2: Classification using data from fire resistance tests, excluding ventilation services*

CEN/TR 15123, *Design, preparation and application of internal polymer plastering systems*

CEN/TR 15124, *Design, preparation and application of internal gypsum plastering systems*

CEN/TR 15125, *Design, preparation and application of internal cement and/or lime plastering systems*

DD ENV 1996-2, *Eurocode 6: Design of masonry structures – Part 2: Design, selection of materials and execution of masonry (together with United Kingdom National Application Document)*

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