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Design, preparation and application of internal gypsum plastering systems

Planung, Zubereitung und Ausführung von Gips-Innenputzsystemen

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**Design, preparation and application of internal gypsum
plastering systems**

Planung, Zubereitung und Ausführung von
Gipsinnenputzsystemen

This Technical Report was approved by CEN on 13 May 2005. It has been drawn up by the Technical Committee CEN/TC 125.

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Foreword

This document (CEN/TR 15124:2005) has been prepared by Technical Committee CEN/TC 125 "Masonry", the secretariat of which is held by BSI.

The initial draft of this document was prepared by the European section of International Union of Contractors of Plastering, Dry Lining, Stucco and Related Activities (UIEP) at the request of the CEN Technical Sector Board (Resolution No.BTS1/56/1991). It has been revised by CEN/TC125/JWG5 in conjunction with CEN/TC241 using a document prepared by Eurogypsum. The CEN technical report gives in different sections guidance for building details, design and materials considerations, the selection of mixes and the application of gypsum plasters. Relevant data are summarized in a series of tables. This document applies to gypsum plasters conforming to prEN 13279-1, applied as an internal plaster. The recommendations are framed in logical sequence, namely materials and accessories; properties of backgrounds that influence the choice of suitable gypsum plastering systems; guidance on preparation of surfaces to be plastered; choice of suitable gypsum plastering systems; methods of application. 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 document 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.

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

This TR should be read in conjunction with EN 13914-2.

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The following similar Technical Reports are also available:

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

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

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Report: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CEN/TR 15124:2005 (E)

1 Scope

This document concerns the design, preparation and application of plaster based on gypsum, 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 plastering system, methods of application and inspection and testing of plastering.

Gypsum plastering mixes with special properties intended to enhance thermal insulation, fire resistance, acoustic insulation and to increase radiation absorption are also covered.

Because of the many and varied materials and practices in Europe it is not possible for certain aspects of the standard to enter into sufficient detail to be fully usable to practitioners in each country.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

gypsum building plaster

plaster consisting of at least 50 % gypsum binder as the principle active binding component. Additives and aggregates may be added by the manufacturer

2.2

gypsum plaster coat

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

2.3

gypsum plaster layers

gypsum plaster applied wet on wet to obtain the final thickness with one or more mixes of the same product, when all operations are completed before the gypsum plaster has set

2.4

gypsum plaster multi-coat

plaster system using a sequence of plaster coats to achieve the required thickness when all operations are completed after the gypsum plaster has set but not dry. A mechanical key is required between each coat

2.5

gypsum plastering system

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

2.6

one coat gypsum plaster

gypsum plaster applied in one coat which fulfils all the functions of an undercoat and a final coat

2.7

gypsum multi-coat plastering system

gypsum plaster coat or sequences of gypsum plaster coats (see 2.8 and 2.9)

2.8

gypsum undercoat

lower plaster coat(s) of a plastering system which needs a final coat

2.9**gypsum final coat**

last gypsum plaster coat of a multi-coat plastering system

2.10**key**

roughness of a surface which enables plaster to make a bond with it

2.11**background**

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

2.12**reinforcement**

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

2.13**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)

2.14**efflorescence**

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

3 Materials and accessories**3.1 Gypsum binders and Gypsum plasters**

Gypsum binders and gypsum plasters should conform to prEN 13279-1.

NOTE Building lime should conform to the requirements of EN 459-1.

3.2 Aggregates

Aggregates should conform to the requirements of EN 13139 or EN 13055-1 as appropriate. Other aggregates may be used which do not exert a harmful influence on the gypsum plaster.

3.3 Bonding agents

Only bonding agents with a proven performance should be used. With all bonding agents it is essential that the manufacturer's instructions should be precisely followed.

3.4 Pigments

Pigments should conform to the requirements of EN 12878. Other pigments should be used only if they are known to be satisfactory. For both, the manufacturer's instructions should be strictly followed.

3.5 Fibres

Fibres may be used in specialized applications such as restoration work, sprayed gypsum plasterings and gypsum plasterings on lathing or insulation board.

The fibres should not adversely affect the chemical or physical stability of the plaster and they should be compatible with the gypsum plaster.

CEN/TR 15124:2005 (E)**3.6 Water**

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

Water fit for drinking is suitable for mixes for plastering

NOTE Attention is drawn to the requirements of EN 1008 in cases where water supplies may be of doubtful quality.

3.7 Reinforcement, lathing and beads

Metal lathing, reinforcement and beads of whatever type, should conform to EN 13658-1 Metal lath and beads – Definitions requirements and test methods – Part 1: internal plastering.

3.8 Fixings

Fixings for lathing and beads such as nails, screws, staples and steel wire should be made of compatible material and should conform to EN 10223-3, EN 10230-1, EN 10244-1 or EN 10244-2.

3.9 Firrings

Firrings should consist of protected or stainless steel channels, rods, steel wire or timber.

Firrings should be of sufficient size so that the lathing and the gypsum plaster applied to the lathing is held rigidly.

Firrings made of timber should have been given a preservative treatment.

4 Design - factors influencing the selection of gypsum plastering systems**4.1 Functions and properties that may be required**

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

A gypsum plastering system will need to fulfil some of the following functions or properties:

- to even out any small unevenness in the background and provide a flat surface (see Table 2);
- 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 **5.2**);
- to improve the thermal properties of a building element (see **5.3**);
- to improve the acoustic properties of a building element (see **5.4**);

— to enhance the protection against radiation .

4.2 Factors influencing the choice of gypsum plaster type or systems

The designer should consider all functional and aesthetic aspects of the building.

The choice of gypsum plaster(s) or gypsum plaster system is determined principally by:

- a) type of building (private houses, buildings); purpose of building (flat, school, hospital, office); uses (for example: 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.

4.3 Background

Consideration should be given to the compatibility between the gypsum plastering system and the background. To achieve this compatibility, the following items should be considered:

- a) The background should provide adequate support: strength, rigidity and adequate key and suction for the adhesion of the gypsum plaster.
- b) Masonry should conform to the requirements of ENV 1996-2.
- c) Boards, slabs and polystyrene should be fixed securely and should only be plastered when they are dry and dimensionally stable.
- d) It is important to avoid:
 - 1) movement of the background, including structural, moisture and thermal movements;
 - 2) defects in the background, e.g. lack of adequate key, weakness, contamination.
 - 3) inadequate suction control;
 - 4) efflorescence

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 should be used.

If it is necessary to plaster over an existing substrate, ensure that it will have 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.

Care should be taken in the following circumstances:

- high and/or variable suction: when the suction is high a pre-treatment incorporating a primer agent should be used;
- low key and suction: when the key and suction of a background is insufficient, then a pre-treatment incorporating a bonding agent should be used.

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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 difficulty with decoration due to the migration of alkalis may be experienced and in extreme cases complete de-bonding of the gypsum plaster coat can occur.

5 Characteristics of gypsum plastering systems**5.1 General**

Gypsum plasters have a controlled set. When the setting process is completed, no further movement takes place. Gypsum plasters may be decorated with most proprietary finishes when dry.

Gypsum plaster can be used in all areas, however they should not be used under persistently damp conditions after they have set, as this causes weakening and disintegration. Gypsum undercoats should be scratched to provide a key for subsequent coats. 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, when fully set and dry, is amongst the least troublesome of plaster surfaces in relation to decorative finish.

5.2 Fire properties**5.2.1 Reaction to fire**

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 EN 13501-1 Fire classification of construction products and building elements, Part 1 classification using test data from reaction to fire tests.

5.2.2 Fire resistance

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 EN 13501-2.

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

5.3 Thermal properties

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 EN 12859:2001, 5.3.2 should be used.

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

ρ	$\lambda_{23/50}$
600	0,18
700	0,22
800	0,26
900	0,30
1000	0,34
1100	0,39
1200	0,43
1300	0,47
1400	0,51
1500	0,54
ρ = density in kg/m^3 $\lambda_{23/50}$ = gypsum thermal conductivity in W/m.K	

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

If enhanced thermal insulating properties are required, then 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) will give the required properties.

5.4 Acoustic properties

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, then special acoustic plasters should be used. Sound-absorbent finishes may affect sound transmission indirectly to some extent by reducing the level of reverberant noise in either the source room or receiving room.

5.5 Resistance to cracking

When the background has been erected in accordance with the relevant standards and the gypsum plastering system prepared and applied in accordance with this document then the gypsum plastering system will perform satisfactorily.

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