DURISOL
WALL FORM SYSTEM

STUCCO AND PLASTER APPLICATION
GUIDELINES

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Durisol

FOR THE APPLICATION TO INSULATING CONCRETE FORMING (ICF) SYSTEMS MADE FROM CEMENT-BONDED WOOD-FIBER BLOCKS OR CEMENT-BONDED LOW-DENSITY WOOD-FIBER PARTICLEBOARDS

With permission by
Österreichische Arbeitsgemeinschaft Putz (ÖAP) – Austrian Plaster Association
Research Working Group for Standardizing Application Guidelines for Pre-mixed Plasters

Excerpt from

APPLICATION GUIDELINES FOR PRE-MIXED PLASTERS

Second Edition

Building With Nature – Insulating Concrete Forming Systems made from Cement-bonded Wood-fiber Blocks

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The following application guidelines apply to pre-mixed (or ready mixed) plasters only, used for the installation of interior and exterior plasters on various surfaces as one-coat or multicoat systems.

Masonry mortars, special mortars (e.g. bonding, acoustical or fire protection plasters), repair plasters and system plasters are not dealt with in these guidelines.

These application guidelines were developed to the best of our knowledge:

- **based on current science**
- **based on application guidelines by manufacturers of pre-mixed plasters**
- **based on practical experience**
- **in cooperation with manufacturers of pre-mixed plasters as well as manufacturers of the raw materials and installers of pre-mixed plasters**

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Important Notes:

1. Plasters are the decoration and protection of a building.

2. The performance of a building depends to a great extent on the quality of the plaster, which in turn is substantially affected by:

- Planning without following the generally accepted laws of building science (e.g. no overhang, random combination of different building materials, no separation joints, exterior wall design with no consideration for local climate conditions, etc.)
- Rushed building schedule (e.g. no time planned for drying out, building during winter, application of exterior plaster prior to or at the same time as interior plaster, etc.)
- Disregard for new plastering techniques, which however are imperative due to new building materials (e.g. wrong selection of building materials, inappropriate design of plaster coats, only the cheapest plaster reinforcement installed, etc.)

3. Giving plastering contracts exclusively to the cheapest bidders will of course result in "cheap" work. Poor and unskilled plaster installations are often the cause for defects and later damages to the building.

4. Saving money with plastering work is a waste of money

Even though the cost for a high quality plaster finish only amounts to 2.5 – 3% of the total building cost, the disregard for the application guidelines will result in repair costs that are many times this amount.

The following "Application Guidelines for Pre-mixed Plasters" not only take into account the current laws of building science, but they also deal with plasters applied to new building materials and modern building techniques, offering alternative solutions. It is a mandatory reference book for designers and installers.

Therefore we recommend consulting the guidelines by the Austrian Plaster Association right from the beginning of the planning and design process. We also recommend that all installers include these guidelines into their terms of business.

AUSTRIAN PLASTER ASSOCIATION

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APPLICATION GUIDELINES FOR PRE-MIXED PLASTERS

Foreword to the Second Edition

Technological developments of wall building materials and plasters as well as changes in building techniques, timing schedules and building usage led to the development of application guidelines for pre-mixed (ready mixed) plasters as early as 1990.

The importance of the application guidelines is also reflected in the fact that its first edition was the reason for the development of a new standard, the ÖNORM B 3346 *"Plasters – Guidelines for Application and Installation."*

Since the publication of the first edition in November 1990, many new developments have taken place, which is why a revision became necessary. The information in the second edition of these Application Guidelines, therefore, represents the latest knowledge on plastering techniques.

Innsbruck, June 1995

1 Plaster Products

In this guideline you find the rules for the application of pre-mixed plasters. The requirements for these plasters are summarized in the two standards ÖNORM B 3340 and B 3321 parts 1 and 2. Pre-mixed plasters manufactured in Austria are usually ÖNORM certified or monitored, respectively.

Pre-mixed plasters are mortars that are formulated and mixed at a factory according to the manufacturer's own guidelines and the ÖAP Application Guidelines.

When using pre-mixed plasters from different manufacturers for the installation of multicoat plasters, the compatibility of the various pre-mixed plasters needs to be verified. Follow the manufacturer's instructions!

The properties of plasters are determined by the binder or the combination of binders, the aggregate(s), the admixture(s) and/or other additives.

1.1 Types of Plasters

1.1.1 Gypsum or Gypsum-containing Plasters

Gypsum or gypsum-containing plasters are classified according to the proportion of the binder:

a) Gypsum plaster (for smooth finishes)
b) Gypsum lime plaster (for smooth or float finishes)
c) Lime gypsum plaster (for smooth or float finishes)
d) Lightweight gypsum plaster (for smooth finishes)
e) Gypsum insulating plaster (for smooth finishes)

1.1.2 Lime, Lime Cement and Cement Plasters

a) Lime plaster with air-lime or hydraulic lime
b) Lime cement plaster
c) Cement lime plaster
d) Cement plaster
e) Lightweight lime cement base coat plaster
f) Lime cement insulating plaster

1.2 General Guidelines for the Application of Pre-mixed Plasters

Air-lime as well as gypsum and gypsum-containing plasters are only suited for interior plasters. The latter are usually only applied as one coat.
Gypsum insulating mortars (interior plasters) can be applied with a machine.
For the application of a smooth finish only gypsum-containing plasters are recommended.

Lime cement, cement and hydraulic lime mortars are suited for interior as well as exterior plasters.
Cement mortars are suited for moisture levels up to group 4 including commercial kitchens, showers as well as the exterior of aboveground foundation walls.

Lime cement insulating plasters with added perlites are usually applied manually. For machine applications special equipment is required. These plasters are used as base coats.

Lime cement insulating plasters with added EPS are usually applied with machines, but they can also be applied by hand. These plasters are used as base coats.

If a bidding document specifies an insulating plaster (any type) on the interior side of an exterior wall, the designer in charge should supply a building science review of the proposed wall system, specifically addressing the condensation issue.

Always adhere to the specified mixing times and amounts of water to be added when using pre-mixed plasters!

1.3 Special Guidelines for Lightweight Base Coat Plasters

Lightweight base coat plasters are hydraulic plasters that have a low density (≤ 1.3 kg/dm^3) and a high elasticity (E-Modul $\leq 3{,}500$ N/mm^2).

Lightweight lime cement base coat plasters are designed for machine applications, which serve as base coats, especially over insulating building materials.

Please note that lightweight base coat plasters are not to be confused with insulating plasters!

2 Plaster Base

The plaster base is the surface of the structural component to which the plaster is applied.

2.1 Types of Building Materials for Walls and Ceilings

The available cement-bonded wood-fiber products for wall and ceiling systems can be classified as follows:

- Cement-bonded wood-fiber blocks (without or with integrated insulation)
- Cement-bonded wood-fiber insulating particleboards (without or with integrated insulation)
- Cement- or magnesia-bonded insulating wood wool boards (without or with integrated insulation)

The requirements for the various cement-bonded wood-fiber products for wall and ceiling systems are set out in the respective ÖNORM standards.

2.2 General Guidelines

2.2.1 Plaster Base Requirements

First of all the plaster installer must be able to assume that the surfaces requiring plastering were built in accordance with the accepted laws of building science.

The type of plaster base has great impact on the selection of plaster materials and especially their application type including preparation of plaster base, plaster thickness, etc.

Prior to plastering, the plaster installer will have to inspect the plaster base for its suitability.

The suitability test includes a visual inspection, a wiping test, a scratch test and a wetting test according to ÖNORM B 3346 § 4.4.

Defects of the plaster base can among other things have a negative impact on the finished plaster such as crack formation.

The plaster installer is usually unable to recognize and verify these kinds of defects.

The ultimate demand for a truly level plaster base is very important because projecting bricks, stones or plates cause irregular plaster thicknesses that are prone to a higher risk of crack formation.

The same applies to joints that are not at all or only partly filled. At those places the plaster forms just a bridge across the open joint. Only the slightest thermal changes (movement, tension) in the plaster base are needed then to cause the plaster to crack.

The plaster base needs to be:

- **level**
- **firm**
- **able to support a plaster coat**
- **sufficiently shape-retaining**
- **not water-repelling, but uniformly absorbent**
- **coarse, dry, dust-free and free from other impurities**
- **free from damaging efflorescence**
- **frost-free or better yet above +5°C/41°F**

2.2.2 Warnings and Hints

The plaster installer should provide the client with a written note, detailing all considerations with regards to the plasterwork including defects that are going to be expected and solutions how to deal with them.

Hint
At each construction site the duty to warn of the potential corrosion risk will also focus on any type of unprotected pipes running across the floor. The risk to mechanically damage pipes and/or insulation during plastering is relatively high. It should also not be overlooked that unprotected metal piping can become damaged through contact corrosion caused by mortar waste. This kind of damage may only become visible years later.

Recommendation
Take photos. Photos not only document the quality of the plaster base (e.g. mixed masonry units in the façade), but also how the duty to warn and install warning signs was performed. In the case of future damage, photos will be important pieces of evidence.

2.2.3 Preparation and Remediation of Plaster Bases (Main Tasks/Subtasks)

The preparation of the plaster base is a step that helps create a plaster base conforming to the requirements set out in ÖNORM B 3346 § 4.6.

The preparation and remediation of plaster bases are not considered main project tasks according to the ÖNORM and require an additional subcontract. The following items are excluded from the main project task: leveling of uneven spots, removal and/or protection of corrosion-prone metal components, filling of joints, dedusting, installing fasteners as well as sealing defective spots, gaps and holes.

2.2.4 Plaster Base Pretreatments

Preparing the plaster base for the plastering **helps facilitate a strong and long-lasting bond between plaster and plaster base**.

Pretreatments for the plaster base (primer, spray precoat or the like) need to be listed as separate tasks. They are not considered a plaster coat (ÖNORM B 3346 § 4.6).

2.2.5 Weather Protection of Building Envelope During Construction

Weather conditions during construction, especially the impact of rain on unfinished masonry work, can later lead to substantial damage of the plasterwork.

2.2.6 Drying Times of Masonry Work and Plaster Base

The drying times specific for each building material need to be adhered to. Because the majority of movement in a building structure occurs during the first few months after installation, a sufficiently long waiting period prior to plastering will reduce the risk of plaster damage.

If the exterior plaster (stucco) is installed before the interior plaster and screed are applied, the plaster quality may suffer, especially during the colder season.

2.2.7 Design-dependent Application Details for Plaster Bases

Depending on the specifics of the architectural, structural and building envelope design, special measures may become necessary prior to, during or after applying the plaster. According to the ÖNORM B 2210, these kinds of additional project tasks need already to be listed in the bid or proposal, respectively.

Chimneys are considered a separate, nonstructural building component. Even the use of reinforcement across the plaster surfaces cannot prevent the formation of cracks.

Therefore it becomes necessary to install flexible connections where the chimney passes through ceiling or wall openings. Some proven solutions include running the masonry wall beside the

chimney and not flush with it, corbelling a projection that will sit on the ceiling or selecting suitable joint profiles.

The following plaster bases are considered problematic because they are non-uniform, also called mixed masonry: change of material in the plaster base, projecting masonry work and masonry edges butting against each other without a structural connection but also gaping joints.

2.3 Plaster Base Testing

2.3.1 General Testing of Plaster Bases

The wipe and scratch tests serve to assess the properties of the plaster base as to whether there are foreign materials present or surface areas that flake, peel or dust.

Making spot checks, the **wipe test** is performed with a flat hand whereas a hard, pointy object is required for the **scratch test**.

With the help of the **wetting test**, it is possible to find out about the absorbency and moisture content of the plaster base.
The wetting test is performed by sprinkling several spots with pure water.

If it is desirable to take accurate measurements of the remnant moisture, a sample can either be tested by a material testing laboratory with CM equipment or by the drying test. The sample needs to be taken from a depth of at least 2 cm (0.78 in). A crown drill with a minimum diameter of 25 mm (0.98 in) needs to be operated at very low rpm in order to take the sample without heating the material too much.

2.3.2.4 Insulating Concrete Forming Systems with Cement-bonded Wood-Fiber Products: Cement-bonded Multilayer Wood Particleboards and Cement-bonded Insulating Wood Particleboards Cement-bonded Multilayer Wood Wool Boards and Cement-bonded Insulating Wood Wool Boards

All wall systems, especially load-bearing walls, need to be installed according to ÖNORM B 3350 or the manufacturer's instructions. It is very important to ensure an accurate horizontal and vertical alignment of the masonry work, the professional installation of inserts and the proper installation of corners, edges, connections, jambs and overlaps.

It is assumed that the concrete is correctly poured and compressed in the cavities of the modular units.

In the case of an obviously poor bond between insulating boards and masonry, loose boards need to be fastened to the surface with appropriate fasteners, loose fasteners need to be tightened and missing fasteners need to be supplemented (fastener schedule!).

Plastering must not proceed **until** the wall including the modular units as well as the encased concrete are sufficiently dry.

Insulating boards or bricks/blocks need to be free from dust and separating agents (formwork oils, waxes or the like). Dirty surfaces need to be cleaned. Wet or weathered boards need to be dried out at appropriate temperatures such as warm and dry weather. If the plaster base is frozen or chilled, plaster must never be applied.

Prior to plastering or precoating, wall surfaces need to be cleaned, any loose pieces need to be removed and replaced with an appropriate material following the manufacturer's instructions. Gaping joints that are greater than 5 mm (0.2 in) have to be filled with an appropriate material so that they are flush without any thermal bridge.

For weather protection of plaster bases see § 2.2.5, for pretreatments see § 3.2.1 and for plaster design see application tables D through F.

2.3.2.5 Mixed Masonry

Even if all precautions during design and preparation have been followed, mixed masonry always remains a problematic plaster base because the different properties of the dissimilar materials are unable to form a uniform surface, resulting in different tensions across various localized surface areas.

3 Application of Plaster

First of all, the contractor must be able to assume that the plaster subcontractor has fully qualified tradespersons who are trained to provide highly skilled, professional plastering work. They must have the fundamental technical knowledge and should also be able to assess plaster bases. If in doubt, the actual plaster installers should consult their supervisors for appropriate advice.

As described under § 2.2.1, the requirements for the plaster base have to be met. Any deviations from the requirements as listed but also short timing schedules have a great impact on the application of plasters. This may make additional treatments necessary, make the actual plastering more difficult or be the cause for later damage.

When the base coat is applied, it has to be known by then with which topcoat the plaster will be finished. This will allow adjusting the surface or coarseness of the base coat to the requirements of the top finish including tiles, wallpaper and the like.

3.1 Weather Impact

The generally accepted rules for construction work do not apply to all weather conditions, especially during winter they are only partly valid.

3.1.1 Warm Weather

The application type of a plaster is strongly determined by such weather conditions as hot temperatures, strong winds (also during foehn wind in winter), direct solar exposure, etc. It may

become necessary not just to pre-wet the wall system, but also to keep the plaster damp with spraying, covers or encasings.

For exterior applications, the installation of a scaffold netting helps considerably to reduce the impact of negative weather conditions, thereby tremendously improving the quality of the finished plaster.

3.1.2 Cold Weather

During application, plaster is a water-containing system that can be destroyed by freezing. During temperatures below 0°C/32°F, the freezing water in the plaster starts to expand. The resulting frost damage is recognized by its flaky appearance and the insufficient firmness of the plaster coat.

The chemical reactions that lead to the hardening of plaster come already to a halt at +5°C/41°F (object temperature). As a result, strength and bonding of the plaster are decreased.

Without special protective measures, plaster should only be applied when the temperature of the ambient air, the plaster base and the plaster compounds are above +5°C/41°F.

Frost-free temperatures must be guaranteed for the entire drying-out time of the plaster.

The measures that are required to ensure frost-free temperatures need to be specified.

It should be noted here that certain types of plasters might require higher minimum temperatures during application. Always follow the manufacturer's instructions for each type of plaster.

During the cold winter season the application of plaster to the exterior side of not-yet insulated surfaces (e.g. concrete ceilings, columns) requires extra care so that the temperature of the building structure does not drop too quickly because this could cause the fresh plaster to freeze.

3.2 Means of Bonding

Spray precoats, special bonding mortars, bonding slurries and bond coats can all serve as bonding agents.

For gypsum-containing plasters applied to concrete bases only bond coats should be used.

For lime, lime cement and cement plasters on any base (except for concrete), mainly spray precoats can be used.

For plastering dense, poorly absorbent concrete surfaces, certified spray precoats, special bonding mortars and also bonding slurries can be used.

3.2.1 Spray Precoats

The spray precoat

a) is regarded as a plaster base preparation.
b) serves as a bonding agent and/or as a suction-modifying agent.

c) is not regarded as a plaster coat.

Because of all the above reasons, spray precoats are not considered part of the main project task according to ÖNORM B 2210, but have to be specified as a subtask.

Depending on the type of plaster base and plaster coats being used, a spray precoat may be required for exterior as well as interior applications. See also application tables in the appendix.

As far as the application of spray precoats is concerned, the plaster installer has to follow both instructions as set forth by the manufacturer of the plaster base AND the manufacturer of the plaster mortar.

For spray precoats the pre-mixed plaster being used should be specifically formulated for this kind of application. The use of plaster or masonry mortar for a spray precoat is not allowed.

Whether the plaster base needs pre-wetting and/or the spray precoat needs to be kept damp depends on the weather conditions and the type of plaster base.

The **setting time of the spray precoat** is mostly determined by

- Type of plaster base
- Type of plaster to be applied
- Weather conditions (season)
- Ventilation

Under average weather conditions, the **minimum setting time** for the **spray precoat** can be assumed as **3 days**.
In the case of **cement-bonded wood wool boards** and **cement-bonded multilayer wood particleboards**, a **minimum setting time** of **2 weeks** needs to be kept.
For further details please consult the application tables in the appendix.

The spray precoat needs to achieve adequate maturity before plastering can start. Sufficient strength can be recognized by the bright color and the relaxation cracks.

If the subsequent plaster coats contain gypsum, a minimum setting time of 3 weeks needs to be kept - no matter what type of plaster base is being used.

It is recommended that the spray precoat on the exterior side should be applied rather early. If possible, it is good to do it whenever the masonry work of one storey is finished.

When a spray precoat is succeeded by a one-coat plaster on an interior surface, the green precoat should have the high spots flattened with, for example, a darby after having started to set. Make sure that the inner corners along walls, ceilings and floors are not filled with the spray precoat to form a semicircle.

If the spray precoat develops a glassy surface, this needs to be roughened with, for example, a wire brush.

Hint:
Do not apply the spray precoat with too much water. This may lead to a coat with too much binding agent whose surface turns glassy and does not bond too well. In such a case, the spray precoat would cause more damage than improvement.

3.2.3 Means of Bonding for Lime, Lime Cement and Cement Plasters

For pre-mixed lime, lime cement and cement plasters, the spray precoat serves as a major bonding agent. Sometimes it contains added synthetic resins.
For dense and poorly absorptive concrete surfaces, special bonding plasters and slurries are being used.

3.2.3.1 Bonding Plasters (Thin-coat Applications)

Bonding plasters are usually special mixtures of cement mortars that have synthetic resins added. At the construction site, they only need to be stirred up with water and applied with a tooth trowel. Whether the subsequent plaster coat can be “wet in wet” or certain standing times and/or posttreatments are necessary has to be taken from the manufacturer’s instructions.

3.2.3.2 Bonding Slurries

Bonding slurries are less often used. They often contain an alkali resistant synthetic resin emulsion, which has cement added until the mixture is spreadable. When applying bonding slurries, the slurry needs to be stirred in the can from time to time to prevent the cement from settling on the bottom. Only apply as much bonding slurry as can be plastered “wet in wet” on the same day.

3.3 Plaster Reinforcement

Plaster reinforcement helps limit crack formation to a tolerable level.
Surface reinforcement with wire mesh or fiberglass fabric cannot completely prevent crack formation, but reduce the risk considerably (ÖNORM B 3346 § 5.5.1).

Wire mesh reinforcement should not be located in the base coat of the plaster, but should be installed as part of the spray precoat in accordance with § 3.3.2 and § 3.4.

Plaster reinforcement is not to be confused with plaster lathing. See also § 3.3.2 and § 3.4.

According to current technology, the **best performance of lime cement plasters** is achieved by troweling a fiberglass reinforcing fabric onto the cured base coat. Around openings, overlaps and diagonal reinforcements are recommended.

If only part of a large plaster base is reinforced such as around window lintels, the final application of a thin-coat finish plaster will make it necessary to first also have the entire non-reinforced portion of the surface area plastered over with the same material.

Thus it is possible to even out minor irregularities and dissimilar suction characteristics between surface areas reinforced with fiberglass fabric and those that are not. Avoid stain formation and shearing connections.

3.3.1 Plaster Reinforcement with Fiberglass Mesh

3.3.1.1 Requirements of Fiberglass Reinforcing Mesh

When using fiberglass mesh for plaster reinforcement, only fiberglass fabric should be used. The following requirements need to be satisfied:

A. Written certificate from an authorized testing agent according to ÖNORM B 6122.

B. The tensile strength of a 5-cm (2 inch) wide tape must be 1500 N/5 cm for both threads, warp as well as weft.

C. Fiberglass mesh needs to be sufficiently alkali resistant.

D. Interior fiberglass fabrics are used exclusively in the interior. Exterior fabrics can be used at the exterior as well as in the interior.

E. The mesh width has to be chosen in accordance with the application type:

- Embedded fiberglass fabric (interior) with a 7 x 7 mm (0.28 x 0.28 in) minimum mesh width

- Troweled-in fiberglass fabric with a 4 x 4 mm (0.16 x 0.16 in) minimum mesh width

3.3.1.2 Installation of Embedded Fiberglass Reinforcing Mesh

The embedding of fiberglass reinforcing mesh is only recommended for gypsum-containing interior plasters.

For embedded fiberglass reinforcing mesh, the mesh width is dependent on the particle size of the plaster.

According to ÖNORM B 3346 § 5.5.1 (3), fiberglass mesh has to be embedded as follows:

- First apply a plaster coat that is ca. two thirds of the final plaster thickness.

- Now embed the fiberglass mesh, covering a minimum of 25 cm (10 inch) beyond the surface area to be reinforced and ensuring 10 cm (4 inch) wide overlaps.

- Try to embed the fiberglass mesh as level and firm as possible.

- At last apply the remaining plaster to obtain the desired thickness.

- In the case of gypsum-containing plasters, always reinforce and plaster only as much as can be finished in one go, that is a maximum surface area of 20 m^2 (215 sqf). It is important to always work "wet in wet."

- The minimum plaster thickness must be 15 mm (0.6 in). It should be noted here that non-reinforced surfaces across the same area may require a thicker plaster to be flush.

In general, ceilings should not have large pieces of plaster reinforcement embedded.
Also see ÖNORM B3346 § 5.5.1 (3).
Reason: In this case working "wet in wet" is impossible.

3.3.1.3 Troweled-in Fiberglass Reinforcing Mesh

The troweling-in of fiberglass reinforcing mesh is usually used in combination with lime cement or cement-containing plasters, respectively.

For requirements of the fiberglass reinforcing fabric see § 3.3.1.1.

In the case of troweled-in fiberglass mesh, the mesh width is determined by the largest particle size of the plaster being used. It should be at least three times as big as the largest particle size, but it should be no smaller than 4 x 4 mm (0.16 x 0.16 in). Definitely follow the manufacturer's instructions.

The following considerations have to be taken into account when troweling in fiberglass reinforcing mesh.

A. The fiberglass mesh is to be pressed into the coat troweled on specifically for the reinforcement.

B. The fiberglass mesh is to be covered on all sides with the special reinforcing plaster.

C. The thickness recommended by the manufacturer is to be adhered to.

D. The minimum overlap between the individual tapes is 10 cm (4 inch).

E. At intersections where more than two layers of fiberglass mesh meet, adequate bonding is guaranteed by cutting out various pieces.

Fiberglass mesh must only be installed once the plaster base coat has cured sufficiently.

3.3.2 Spray Precoat with Reinforcement

A spray precoat with reinforcement serves as plaster lathing and needs to be installed across the entire surface to be plastered.

The following points should receive special consideration:

A. Use galvanized (non-rusting) welded metal mesh with a mesh width of 20 x 20 mm (0.8 x 0.8 in) up to 25 x 25 mm (0.98 x 0.98 in), a wire diameter of 1 mm (0.04 in) and a minimum overlap of 10 cm (4 in).

B. The minimum thickness of the reinforced spray precoat is 8 mm (0.32 in).

C. The metal mesh needs to be placed in the center of the reinforced spray precoat, which can be achieved by installing appropriate spacers.

D. Minimum setting time: 3 weeks.

3.4 Plaster Lathing

Plaster lathing is regarded as a type of plaster base and should be installed following the manufacturer's instructions: spray precoat with reinforcement according to § 3.3.2 of this guideline, Stauss Ziegelgewebe® (www.europerl.com) as reinforcement for spray-on coats, Stucanet® or expanded metal lath with adequate lapping and appropriate furring nails as well as plaster profiles including corner and casing beads with expanded metal flanges and appropriate fasteners.

When installing plaster lathing, it is very important to consider plaster thickness. If, for example, the surface area with plaster lathing butts against a one-coat application in the same plane, the latter may require more or thicker plaster coats.

When plastering over plaster lathing, the addition of plaster reinforcement can help considerably to prevent crack formation.

3.5 Gaps and Holes

According to ÖNORM B 2206 *Masonry Work – Project Specification Guidelines* § 1.3.28, the filling of gaps and holes is considered a main project task and needs to be finished in a timely manner well before starting the plasterwork.

Hint:
When applying plaster over freshly filled gaps, holes or infills, the potential shrinkage of the gap and/or infill mortar can also adversely affect the plaster coats (risk of cracking!).

In accordance with ÖNORM B 2210 § 2.4.1. (16) the following explanations are given here:

The plastering of gaps is considered a subtask only up to the 1.5 measurement of the respective nominal plaster thickness.

If the required plaster finish and/or plaster reinforcement/lathing exceeds this measurement, it is not considered a subtask according to ÖNORM B 2210 § 2.4.1. (16) and is therefore regarded as a main project task. As a result, this plastering task needs to be specified separately.

Metal components such as nails and fastening wires that are prone to corrosion must be removed so that none of them project into the plaster coat. Prior to plastering, all visible, remaining metal components need to be treated with a corrosion protective coat. At the same time water-carrying pipes need to be covered with a condensation protection.

Hints for plaster installers, electricians and masons!

The type of bonding and filling mortar needs to fit the type of plaster being used as well as the type of application. See also § 3.6 *Plasters in "Wet Rooms"*.

It has to be taken into consideration that all piping under lime cement or cement plasters cannot be fastened with gypsum-containing products, but with, for instance, a fast-setting cement.

And it should be repeated here that gypsum-containing bonding materials could only be used where subsequent layers of plaster also contain gypsum. Fast-setting cement mortars under gypsum plaster, however, may lead to flaking of the plaster in the future.

Special filling mortars that under certain circumstances can be used without lathing should be applied according to the manufacturer's instructions.

3.6 Plasters in "Wet Rooms" and for Tiling

According to ÖNORM B 3346 table A3, rooms are classified into four groups based on their moisture level, ranging from W1 to W4. Also see table 3.

Prior to plastering, all surfaces that are going to have tiles installed must be marked as such in the building plan and must also be listed in writing for the plaster installer. These tile areas must only have a one-coat plaster applied that must not be scraped or flattened.

Any plaster surfaces that were already flattened or scraped need to be roughened and dedusted prior to laying tiles.

The plaster (lime cement plaster as well as gypsum-containing plasters) needs to have a minimum thickness of 10 mm (0.4 in) and a compressive strength of at least 2.0 N/mm^2.
The pre-mixed plaster being used has to meet the requirements of the respective moisture level group.

Lime cement plasters are suited for the moisture level groups W1 and W2 without special pretreatments.

For moisture level groups W3 and W4, pretreatments - as outlined in table 3 - have to be performed prior to tiling. For moisture level group W4, the use of pre-mixed cement plaster is recommended.

Gypsum-containing interior plasters must only be used for moisture level groups W1 through W3. The following prerequisites also have to be met:

- For moisture level group W1 no pretreatment is required.

- For moisture level group W2 all surfaces that are going to have tiles installed need to be pretreated with a primer prior to the application of the tile adhesive. Since primer and adhesive in combination with mortar and tiles have to be compatible with each other, it is recommended that the priming be also done by the tile installer.

- Surface areas of moisture level group W3 should be specifically marked by the designer because they must be sealed completely against moisture. The sealing of the plaster base should be done according to ÖNORM B 2207 (1995 edition).

Any plaster profiles, reinforcement, lathing and the like needs also to be selected according to the moisture level group.

Swimming pool, sauna and/or hot tub areas all fall into the moisture level group W4. For these kinds of high-moisture areas, pre-mixed plasters with cement as the main bonding agent are recommended. Then the sealing according to ÖNORM B 2207 (1995 edition) is not necessary.

Table 3: Selection of Plasters and Sealers for Interior Surfaces Based on the Moisture Level Group (ÖNORM B 3346)

1. Classification of Moisture Level Groups

Type of Moisture Level	Time & Intensity of Moisture Exposure (Moisture Level Groups)			
	W1	**W2**	**W3**	**W4**
Air Humidity (condensation)	increased, no condensation	high for short periods; sometimes condensation	high for short periods; condensation	high for long periods; condensation, steam
Cleaning Water	wet sweeping periodically	wet sweeping, wet cleaning periodically	wet cleaning periodically	intensive cleaning daily
Splash Water	-----	short exposure: low to medium	short exposure: high	long exposure: medium to high

2. Practical Examples for all 4 Moisture Level Groups

	W1	**W2**	**W3**	**W4**
	hallway, toilet, stairwell	residential kitchens, commercial washrooms	splash water area in residential shower stalls and bathrooms	commercial kitchens, shower stalls and laundry rooms

3. **Pretreatment Requirements for Tiles with regards to the type of bonding agent of the plaster and moisture level group**

Bonding Agent of Plaster	W1	W2	W3	W4
Cement	No pre-treatment required			
Cement/Lime	no pretreatment required	no pretreatment required	alternative sealing ÖNORM B2207	sealing ÖNORM B2207
Gypsum	no pretreatment required	priming ÖNORM B2207	sealing ÖNORM B2207/B2209	use no gypsum-containing plasters

3.2 Trowel Cuts, Joints and Profiles

Structural joints or expansion joints must not be plastered over.

Exterior Surfaces:
At exterior surfaces trowel cuts must not be made, but appropriate joint or plaster profiles need to be installed.

3.7.1 Trowel Cuts

Application: Prior to floating or flattening, the plaster coat is cut through with a trowel edge or knife blade down to the plaster base. Then the plaster surface is finished whereby the cut remains invisible for now.

In case of movements coming from the plaster base, the forming crack will run in an almost straight line along the trowel cut.

Trowel cuts are not suited for plaster bases with dissimilar materials such as masonry infill or blunt butting ends. In those areas plaster reinforcement can help reduce the formation of cracks, but never prevent it completely.

Trowel cuts can only affect the appearance of a forming crack, making it look straight instead of an irregular zigzag. A trowel cut is a kind of "target line for the crack".

When trowel cuts for inner corners or blunt butting masonry ends are required (ÖNORM B 3346 § 5.5.3), they are considered part of the main project task according to ÖNORM B 2210 § 1.3.5 (12).

3.7.2 Plaster or Caulking Joint

Installation:
Before having set completely, the plaster is cut through down to the plaster base. This joint will remain visible. After an appropriate setting and drying time, the joint can be caulked appropriately.

Types of Application: non-connected chimneys and separating walls, steel reinforced concrete structures with masonry infill (parapet infill), veneer walls.
The possibilities to bridge such problem areas with fiberglass reinforcing mesh or plaster lathing are rather limited. See also 2.2.7 *Design-dependent Application Details for Plaster Bases*.

3.7.3 Joint Profiles

Structural joints have to be made with appropriate plaster profiles (see § 3.7.4). The type of plaster profile required has to be selected based on the structural requirements and should already be listed in the bidding document.

3.7.4 Plaster Profiles

Often plaster profiles are not only required for the application of pre-mixed plasters (e.g. corner beads for one-coat interior plasters), but they can also become necessary for structural and/or application details that can only be installed with the help of a plaster profile (e.g. expansion joint beads).

3.7.4.1 Selection of Profiles

The selection of a plaster profile (e.g. corner or casing beads) is not only determined by its future function, but its compatibility with the plaster material also has to be taken into account.

The following points are to be taken into consideration when selecting a plaster profile:

Profiles made from galvanized steel are suited for plasters in neutral and alkaline areas such as gypsum, lime, lime cement and cement plasters as well as coats where reinforcing mesh is troweled in.

Profiles made from aluminum are **not** suited for strongly alkaline (lime- or cement-containing) plasters and trowel coats.

For any area with higher corrosion levels, suitable galvanized profiles should be used whereby the use of stainless steel profiles is highly recommended. The following applications would, for example, fall into this category: exterior surfaces, sanitary facilities, windowless spaces with forced ventilation, shafts.

For commercial wet rooms such as swimming pools, saunas or the like, appropriate profiles and beads need to be designed in cooperation with the manufacturer of the profiles.

In any case, both the specifics of the proposed installation areas as well as the application guidelines of the profile manufacturer need to be taken into consideration.
(material selection, required lapping, etc.)

3.7.4.2. Installation of Profiles

Galvanized plaster profiles should be cut with metal shears, in the case of very thick profiles a metal handsaw should be used. **The cutting with an angle grinder will cause the galvanized coating around the cut to be burnt. As a result, the profiles will rust in these areas.**

For gypsum-containing plasters, the profiles can be attached with a mixture containing the same ingredients like the plaster.

In “wet rooms” or other surfaces that are plastered with cement, lime cement or bonding plaster/masonry mortar, profiles must not be combined with gypsum-containing materials. The same applies to exterior applications. Specifically formulated cement mortars are best suited for these applications.

The profiles or beads should be fastened every 50 cm (20 in). When for the fastening of the profiles galvanized nails were being used, they need to be removed after the plaster has started to set.
Galvanized and aluminum profiles must not touch each other because this poses the risk of contact corrosion.

3.7.4.3 Important Measures to Make Profiles Work

Isolation and Expansion Joints
It is imperative to keep these types of joints free from mortar and plaster.
Expansion Joint
After the plaster profile has started to set, check the profile and ensure it is functioning properly.
Exterior Plasters with Galvanized Profiles that have no Polymer Coating
It is important to protect and cover the profiles completely with an appropriate finish coat.

3.8 Application of One-coat Plasters and Base Coats

3.8.1 General Application Hints

- Plaster thicknesses (nominal, minimum) should be chosen according to ÖNORM B 2210 and B 3346.
- Follow the instructions set forth by the manufacturers of pre-mixed plasters.
- Test plaster base for surface characteristics and prepare it according to § 2.3.2 ff.
- Apply pretreatments as required for specific products and/or weather conditions (e.g. pre-wetting).
- Avoid hollow spaces behind plaster profiles (e.g. quick installation beads, corner beads).
- Where plaster butts against other building components, the plaster should be installed to be either flush with the respective adjoining component or uniformly set back.
- Building components (e.g. window jambs) that butt against the plaster should be uniformly plastered around.
- Use appropriate grounds where required (e.g. openings that will have the jambs inserted later).

3.8.1.1 Special Installation Hints for Gypsum-containing Plasters

It is important to always work “wet in wet” when applying one-coat gypsum-containing plasters, for example, when embedding reinforcing fabric. But also follow the manufacturer’s instructions.

3.8.1.2 Special Installation Hints for Base Coats with Multiple Layers

The different plaster layers should have the same thickness and should be properly leveled. Whether it is necessary to work “wet in wet” or the surface of each previous layer needs to be roughened or raked has to be learnt from the manufacturer’s instructions.

Avoid separation layers that are produced, for instance, by flattening a plaster coat with a steel trowel.

3.8.1.3 Special Installation Hints for Lime Cement Insulating Plasters

- Using a rough wooden lath for leveling prevents the formation of laitance at the plaster surface.
- For insulation plasters, specifically designed levelers are suited to knock down the plaster without producing laitance.

3.8.1.4 Special Installation Hints for Lightweight Lime Cement Base Coats

Please follow the manufacturer's application instructions for lightweight lime cement base coats!

Under certain circumstances (e.g. applications by hand) plaster base pretreatments in the form of a spray precoat may become necessary for lightweight lime cement base coats.

- Application, setting times and topcoats are the same as for normal lime cement plasters.
- If necessary, trowel a fiberglass reinforcing fabric into the entire plaster surface according to the application tables.
- Lightweight base coats can also be used as interior base coats.
- As far as tiling is concerned, the same requirements as for normal strength lime cement plaster apply.

3.9 Top or Finish Coat Applications

One-coat interior plasters usually have no additional topcoat applied. If it is desirable to finish the interior plaster with a topcoat anyhow, the following points should be taken into account:

- Do not flatten or smooth plaster surface.
- Depending on the construction site and ventilation conditions, the plaster should set for at least 3 weeks.
- Depending on the product used, a primer may be required.

For the application of thin-coat finish coats (that are as "thin" as the particle size of the plaster), it may become necessary to apply a suitable coating that equalizes the surface across the lime cement base coat (interior and exterior).

Hint:
Please consider the special requirements for protecting the exterior plaster surfaces from driving rain. If necessary, apply additional coating to the base coat as rain protection. Depending on the specifics of a situation, this task may have to be listed in addition to the main project task.

When the application of the base coat (e.g. knock-down) causes a film of laitance to form at the surface of the coat, this needs to be removed.

When an insulation plaster is finished with a thin-coat plaster, a suitable coating to equalize the surface of the base coat is required. For exterior surfaces that are not too exposed to harsh weather conditions (e.g. large roof overhangs) this equalizing coating can be left out.

However, depending on the products being used and the prevailing climatic conditions, a pretreatment of the base coat (pre-wetting, priming, etc.) may become necessary.

During the application of topcoats, the temperatures specific to each product need to be strictly adhered to.

Exterior facades are often exposed to extreme thermal conditions (e.g. solar exposure > thunderstorm rain > solar exposure > shade, etc.) that may lead to the formation of hairline cracks. Topcoats with a somewhat coarser surface (particle size above 2 – 3 mm/0.08 – 0.12 in) and a bright finish can counteract this.

3.9.1 Top or Finish Coats, Natural Colors

In the interior, lime or lime cement finish coats are used.

At the exterior, only exterior topcoats should be used that must have a reduced capillary activity. Or the topcoat needs another finish to meet this requirement. Therefore the topcoat should be specified accordingly.

3.9.2 Top or Finish Coats, Colored

3.9.2.1 Lime Cement Finish Plasters

Thick-coat Finish Plasters

The thickness of these plasters is thicker than the maximum particle size of, for example, a scratch, trowel, float or slurry coat. Therefore they are applied directly to the base coat.

Thin-coat Finish Plasters

Lime cement finish plasters with added synthetic resins can also be applied with a thickness that corresponds with the maximum particle size of the plaster. For lime cement insulating plasters and coarse lime cement base coats, however, an additional coating is required.

Follow the hints under § 3.10! If necessary, apply additional coating in-between coats. If need be, remove laitance at the surface.

3.9.2.2 Silicate Plasters

Silicate plasters are thin-coat finish plasters that have silicates (waterglass) and organic binding agents added. The base coat needs to be pretreated with an appropriate primer.

For insulating plasters and coarse lime cement plasters, silicate plasters also require an additional bonding coat.

When applying silicate plasters, glass surfaces, windows, polished masonry veneers and the like need to be properly protected. Always adhere to the specified minimum temperature for the application of silicate plasters.

3.9.2.3 Synthetic Resin Plasters

Synthetic resin plasters are thin-coat finish plasters that have synthetic resins added. The base coat needs to be treated with an appropriate primer.

For the application to coarse lime cement plasters, synthetic resin plasters require an additional bonding coat. They are not recommended for insulating plasters.

3.9.2.4 Silicone Plasters

Silicone plasters are thin-coat finish plasters that have silicone resin and organic binding agents added.
The base coat requires an appropriate prime coat.

For the application to insulating plasters and coarse lime cement plasters, an additional bonding coat is required.

3.10 Setting Times for Plasters

The setting time is the minimum period of time one has to wait until it is possible to proceed with the next preparation or application step.

Curing, hardening and drying times are determined by the type of binding agent, the weather conditions and site specifics.

The following factors have great impact on the setting times of plasters:

- Surface characteristics of plaster base
- Type of plaster
- Design of the plaster system
- Plaster thickness
- Weather conditions (season)
- Ventilation

3.10.1 Setting Times for One-coat Interior Plasters

For the setting or drying times of interior plasters, ventilation conditions have the greatest impact. Therefore no general guidelines for setting and drying times can be given. Furthermore it should be noted here that the double thickness of an interior plaster would most likely result in a drying time that is four times as long.

The following very general guidelines for interior plasters can be given:

The higher the gypsum content of a plaster is, the shorter the setting and drying times will be.
The higher the lime content of a plaster is, the longer the setting and drying times will be.

For a 15-mm (0.6 in) thick lime gypsum plaster, for example, it can be assumed that during ideal weather and ventilation conditions the plaster will be dry enough after about 14 days to allow for the next preparation or application step.

3.10.2 Setting Times for Multiple Coat Plasters

Type of Plaster	Recommended Minimum Setting Time in Days /1 cm	Plaster Thickness	
		Interior Setting Time	Exterior Setting Time
Standard Plaster	14 days /1 cm (0.4 in)	10 mm – 14 days (0.4 in)	15 mm – 21 days (0.6 in)
Low-strength or Lightweight Plaster	10 days /1 cm (0.4 in)	15 mm – 14 days (0.6 in)	20 mm – 21 days (0.8 in)
Insulating Plaster	7 days /1 cm (0.4 in)	20 mm – 14 days (0.8 in)	35 mm – 25 days (1.4 in)

3.10.3 Setting Times for Trowel Coats and Thin-coat Finish Plasters

Trowel coats and/or reinforcing fabric embedment: Minimum setting time 7 days*
Thin-coat plasters as a bond coat for finish coats: Minimum setting time 7 days*
*Or according to the manufacturer's specifications

DURING UNFAVORABLE WEATHER CONDITIONS LONGER DRYING TIMES NEED TO BE ADHERED TO!

Any setting times shorter than the ones given above may lead to a higher risk of crack formation, for which the person who specified the shorter setting time (manufacturer, owner, contractor, plaster installer, etc.) will have to be accountable.

In any case it is the responsibility of the very professional who will apply the next plaster coat, surface treatment or wall/floor covering to thoroughly test whether the plaster has achieved adequate maturity for the next step.

3.11 Plaster Surface Treatments

3.11.1 Leveling of a Plaster Surface

3.11.2 Plaster Surface Treatments

- **Leveling & Screeding**
  The plaster mortar is flattened to create a plumb, flush and even surface. During this treatment step, the traces from the leveling tools, respective grounds or other surface irregularities remain visible.

- **Knocking-down**
  The surface of the flattened plaster coat is scraped lightly to remove the highest spots or humps.

- **Scraping & "Cutting"**
  The plaster coat is applied and scraped down to form a rough surface. Surface irregularities and small hollows remain visible even though the surface skin should not be torn open.

- **Floating & Scouring**
  The plaster surface is scoured according to the particle sizes of the plaster. In the case of lime, lime cement and cement plasters, usually a thin double-up coat is added whose thickness corresponds with the largest particle size of the plaster. Once the surface is finished with a float, small conical hollows must not be visible anymore.

One-coat plasters applied to concrete surfaces tend **to blister**, which is why it takes extra effort to apply them appropriately to a concrete background.

- **Smoothing & Polishing**
  Specifically formulated gypsum-containing plasters are scraped, smoothed and polished until a very flat surface is achieved that appears to have almost no pores. Smooth finishes cannot be made to be completely free from pores or absolutely plumb and flush, especially when looked at with light from the sides.

  With so-called burnishing, an intensive and repeated rubbing and polishing action, it is possible to create extremely smooth and shiny plaster surfaces that are almost absolutely even.

Lime and lime cement plasters are not smoothed or polished with a trowel.

- **Scratching & Raking**
  After the plaster has been applied, flattened and started to set, the surface of the plaster coat is scratched with a rake or scarifier whereby the surface skin is completely destroyed or roughened and the plaster texture underneath becomes exposed.

Plaster Bases for Ceramic Covers (Tiling)
If an interior plaster is specified to serve as a thin-bed plaster base for a ceramic cover, the plaster needs to be knocked down or, in the case of machine applications, scraped. Be sure to create a plumb and flush surface.

Gypsum-containing plasters should not be smoothed and polished when they are to serve as backgrounds for ceramic surface treatments later.

3.12 Plaster Posttreatment

3.12.1 Interior Plasters

After having applied the complete interior plaster, it is very important to ensure proper cross ventilation even in the presence of a temporary heating system during construction.

For the hardening process, a sufficient air exchange and not too fast moisture evaporation is required. The necessary steps to ensure the proper setting of the plaster are either provided by the main contractor or have to be agreed upon with the plaster installer.

The plaster must not be exposed to direct heat. And the hot air stream of a heater must not be directed to the plaster surface or be too close to it.

The use of dehumidifiers extracts the water necessary for binding and hardening the plaster too quickly, resulting in damages to the finished plaster.

3.12.2 Exterior Plasters

Exterior plasters need to be protected from drying out too quickly. If necessary, the plaster needs to be kept damp with water.

3.12.3 Setting Times for Plasters

See § 3.10.

3.13 Requirements of the Finished Plaster

3.13.1 General Hints

The finished plaster needs to fulfill the properties specific to the material used and satisfy the standard requirements.

The plaster must properly bond with the plaster base.

For plaster surfaces in wet rooms or those that will be finished with tiles, the hints of § 3.6 and table 3 should be consulted.

3.13.2 Finished Plaster Surface

Finished, that is sufficiently dry, plaster surfaces must fulfill the required performance characteristics and look uniform, which is the hallmark of a professional application.

Blisters in the finished plaster surface are not allowed. See § 3.11.2.
Edges, profiles and joints must run in straight lines and are not allowed to be broken off and/or wavy.

Hint:
When butting a new plaster against an existing plaster (e.g. remodeling, adding-on), the new surface area or butt joint will always remain visible. The surface texture will also look different because of the new material and the often changed colors of the previous plaster.

Prior to any plasterwork, it is important to discuss the expected/to be expected results in full detail.

Hint:

When topcoats have to be applied to base coats with a different age and/or dissimilar materials, textures and colors will differ due to the varying degrees of suction.

The assessment of finished plaster surfaces based on previously created sample surfaces, as is often required in bidding documents, is highly problematic because the person who made the sample will usually be not the same person that is going to apply the new plaster. Furthermore the varying weather conditions during the time of the sample making or the new plaster application also have an impact.

Irregularities in the surface texture and smoothness must not be obvious during normal light conditions. The assessment of finished plaster surfaces while being exposed to direct light from the side (e.g. artificial lighting, sunlight) is not allowed. Also see ÖNORM B 3346 §5.8. (2).

3.13.3 Evenness, Plumbness and Right Angle Alignments of Plaster Surfaces

The required measurement tolerances according to ÖNORM B 3346, Table A 1b must not be exceeded.

A practical note on the standard measurement tolerances:

The camber measurements given in the ÖNORM can be applied to all plaster surfaces without regards to openings, fitted components or the like.

Fitted components such as window sills and reveals should be plastered uniformly, that is, with the same thickness and width all around each component.

The plaster installer must be able to assume that the fitted components are installed plumb and flush. The plaster installer does not check that prior to starting the plasterwork.

For fitting reasons there could be fixed measurements provided; if this is not the case follow the principles of craftsmanship and what makes practical sense.

Deviations around fitted components must not be obvious.

Large, uniform plaster surfaces require a higher level of craftsmanship.

When, for example, plaster laths are used around door openings, where the jamb is installed later, ÖNORM B 1100 should be consulted.

3.13.4 Cracks – Causes of Cracks

Cracks can be caused by different factors such as:

- Foundation settling
- Different loads
- Changing loads due to, for instance, renovations
- Too quick drying
- Shrinkage and compression
- Unfavorable formats

- Building materials with different properties abutting each other
- Open vertical and horizontal joints
- Projecting corners
- Wall openings
- Structural changes in the uppermost ceiling and other load-bearing building components
- Different thermal exposure (e.g. sun/shade, bright/dark colors, different colors across one surface)
- Vibrations (e.g. traffic, earthquake)
- Other factors

When the building materials beneath the plaster base are silhouetted through the plaster surface, the following reasons might be assumed:

- Wrong timing for applying the plaster (e.g. if the material of the plaster base has not shrunk to its final size or seasonal impacts)
- Too much moisture in the plaster base (e.g. weather protection missing)
- Plaster base not properly installed (e.g. too big and/or too deep joints, improperly installed insulating concrete forming systems)
- Poor craftsmanship during plastering (e.g. Not adhering to the guidelines set out in this document!)

The finished plaster must not show cracks wider than 0.2 mm/0.007 in.

A greater amount and/or concentration of cracks (even if below the tolerable width) must not adversely affect the technological properties or building science performance of the object.

This kind of evaluation can only be performed as part of a professional assessment. Prior to any remediation work, the cause(s) of the cracks needs to be identified including the degree of damage and the continuing damage to be expected.
In this context it is recommended to consult the ÖNORM B 2230 part 2: *Painting: Surface Treatments of Masonry, Plaster, Concrete and Lightweight Boards – Project Specification Guidelines*.

3.14 Surface Treatments, Coatings, Tiles & Coverings

For surface treatments of concrete such as coatings, coverings or tiles, the following points need to be taken into consideration.

3.14.1 Paints and Finishes

When plaster surfaces are dry, hardened and sufficiently carbonized, suitable paints and finishes can be applied.
On plaster surfaces containing gypsum, silicate paints can only be used when first a pretreatment according to the manufacturer's instructions is applied. It is recommended to create some sample surfaces to assess its suitability for each individual case.

In this context it is recommended to consult the ÖNORM B 2230 part 2: *Painting: Surface Treatments of Masonry, Plaster, Concrete and Lightweight Boards – Project Specification Guidelines*.

3.14.2 Surface Coatings, Wallpapers and Small Size Tiles

(Creating only very little additional tension in the plaster)

The above listed surface treatments can be applied to any type of plaster as long as the guidelines of the ÖNORM B 2223: *Wallpapering – Project Specification Guidelines* are adhered to. If the plaster contains gypsum, a pretreatment may become necessary.
Also follow the manufacturer's instructions.

3.14.3 Surface Coatings, Heavy Wallpapers, Ceramic Tiles, Mosaics, Glued Coverings

(Creating substantial additional tension in the plaster)

Due to the additional shear stress in the plaster, such surface treatments must only be installed over pre-mixed plasters with a compressive strength > 2 N/mm^2.

The type of pretreatment or sealing has to be selected according to the moisture level group. See table 3.

The starting date of the surface treatment application is determined by the degree of the dryness of the plaster and in the case of lime or lime gypsum plasters also the degree of carbonization.

Follow the manufacturer's instructions and the guidelines of ÖNORM B 2207: *Working with Tiles, Plates and Mosaics – Project Specification Guidelines*.

4 Application Tables

In the following tables, you will find application hints with regards to the plaster base for interior and exterior plasters.

The application hints are general guidelines, apply to average conditions and are based on long practical experience as well as laboratory results from experimental wall systems.

In order to produce high quality plaster applications that, for example, are free from damaging cracks, the following requirements should be fulfilled: building materials of walls and ceilings as well as plasters must meet current technical standards, the installation of the plaster base such as walls and ceilings must also meet current building codes and the Application Guidelines for Pre-mixed Plasters given in this document need to be adhered to.

Special climatic or structural conditions, also very short installation times as well as unusual planning and design conditions will require extraordinary measures during the installation of the plaster base as well as the plastering itself. In the application tables listed below such special cases could not be accounted for.

Application Table D: Plaster Design for Cement-bonded Wood-fiber Blocks with or without Integrated Insulation

<table>
<tr><th colspan="3">INTERIOR PLASTER – One-coat Plaster</th></tr>
<tr><th colspan="2">Types of Plaster</th><th>Plaster Base Pretreatment and/or Additional Measures</th></tr>
<tr><td colspan="2">Gypsum plaster (smooth finish)
Gypsum lime plaster (smooth & float finishes)
Lime gypsum plaster (float & smooth finishes)
Lightweight gypsum plaster (smooth finish)
Gypsum insulating plaster (smooth finish)
Lime plaster (float finish)</td><td>No pretreatment required</td></tr>
<tr><th colspan="3">INTERIOR PLASTER – Multicoat Plaster</th></tr>
<tr><th colspan="2">Plaster Design
Base Coat</th><th>Finish Coat</th><th>Plaster Base Pretreatment and/or Additional Measures</th></tr>
<tr><td>Lime cement plaster[1] (leveled, scraped, knocked down)
Lightweight lime cement base coat (leveled, knocked down)</td><td rowspan="2">Gypsum plaster
Gypsum-containing plaster
Lime cement plaster
Lime cement finishing plaster
Lime plaster
Silicate plaster[3]
Synthetic resin plaster[9]
Silicone plaster[3]</td><td>No pretreatment required</td></tr>
<tr><td>Lime cement insulating plaster – Perlites (leveled, scraped)
Lime cement insulating plaster – EPS (leveled, scraped)</td><td>Depending on the particular plaster product, a cement spray precoat may be required.
Min. setting time: 2 weeks
Follow manufacturer’s directions.</td></tr>
<tr><th colspan="3">EXTERIOR PLASTER</th></tr>
<tr><th colspan="2">Plaster Design
Base Coat</th><th>Finish Coat</th><th>Plaster Base Pretreatment and/or Additional Measures</th></tr>
<tr><td>Lime cement plaster[1] (leveled, scraped, knocked down)</td><td rowspan="3">Gypsum plaster
Gypsum-containing plaster
Lime cement plaster
Lime cement finishing plaster
Lime plaster
Silicate plaster[3]
Synthetic resin plaster[9]
Silicone plaster[3]</td><td>Spray precoat
Min. setting time: 2 weeks</td></tr>
<tr><td>Lightweight lime cement base coat (leveled, knocked down)</td><td>Pretreatment not required, only an embedded fiberglass mesh is recommended according to § 3.3.1.3.</td></tr>
<tr><td>Lime cement insulating plaster – Perlites (leveled, scraped)
Lime cement insulating plaster – EPS (leveled, scraped)</td><td>Depending on the particular plaster product, a cement spray precoat may be required.
Min. setting time: 2 weeks
Follow manufacturer’s directions.
Embedded fiberglass mesh is recommended according to § 3.3.1.3.</td></tr>
<tr><th colspan="3">SPECIAL PLASTERS</th></tr>
<tr><td colspan="3">Follow manufacturer’s instructions.</td></tr>
</table>

1) Under very good conditions, e.g. plaster bases with weak and uniform suction, with little varying plaster thickness and uniformly sealed masonry joints, it can also be installed as a one-coat plaster.
3) Finish plasters made from silicate or silicone require a bonding coat and always a primer when applied to insulating plasters and coarse lime cement plasters.
5) Fiberglass mesh not required for cement-bonded wood-fiber blocks without integrated insulation.
6) In manual applications a cement spray precoat is required.
9) Finish plasters made from synthetic resins require a bonding coat and always a primer on coarse lime cement plasters. **They are not recommended for lime cement insulating plasters.**

Application Table E: Plaster Design for Cement-bonded, Single-layer Wood-fiber Insulation Boards in an ICF System

<table>
<tr><th colspan="3">INTERIOR PLASTER – One-coat Plaster</th></tr>
<tr><th colspan="2">Types of Plaster</th><th>Plaster Base Pretreatment and/or Additional Measures</th></tr>
<tr><td colspan="2">Gypsum plaster (smooth finish)
Gypsum lime plaster (smooth & float finishes)
Lime gypsum plaster (float & smooth finishes)</td><td>No pretreatment required.[7]</td></tr>
<tr><td colspan="2">Lightweight gypsum plaster (smooth finish)
Gypsum insulating plaster (smooth finish)</td><td>Depending on the particular plaster product, a cement spray precoat may be required.
Min. setting time: 3 weeks
Follow manufacturer’s directions.</td></tr>
<tr><td colspan="2">Lime plaster (float finish)</td><td>Embedded fiberglass mesh[7] is recommended according to § 3.3.1.3.</td></tr>
<tr><th colspan="3">INTERIOR PLASTER – Multicoat Plaster</th></tr>
<tr><th colspan="2">Plaster Design
Base Coat / Finish Coat</th><th>Plaster Base Pretreatment and/or Additional Measures</th></tr>
<tr><td>Lime cement plaster (leveled, scraped, knocked down)</td><td rowspan="3">Gypsum plaster
Gypsum-containing plaster
Lime cement plaster
Lime cement finishing plaster
Lime plaster
Silicate plaster[3]
Synthetic resin plaster[9]
Silicone plaster[3]</td><td>Embedded fiberglass mesh is recommended according to § 3.3.1.3.</td></tr>
<tr><td>Lightweight lime cement base coat (leveled, knocked down)</td><td>Pretreatment not required, only an embedded fiberglass mesh is recommended according to § 3.3.1.3.</td></tr>
<tr><td>Lime cement insulating plaster – Perlites (leveled, scraped)
Lime cement insulating plaster – EPS (leveled, scraped)</td><td>Depending on the particular plaster product, a cement spray precoat may be required.
Min. setting time: 2 weeks
Embedded fiberglass mesh may proof beneficial according to § 3.3.1.3.
Follow manufacturer’s directions.</td></tr>
<tr><th colspan="3">EXTERIOR PLASTER</th></tr>
<tr><th colspan="2">Plaster Design
Base Coat / Finish Coat</th><th>Plaster Base Pretreatment and/or Additional Measures</th></tr>
<tr><td>Lime cement plaster (leveled, scraped, knocked down)</td><td rowspan="3">Lime cement plaster[8]
Lime cement finishing plaster[8]
Silicate plaster[3, 8]
Synthetic resin plaster[8, 9]
Silicone plaster[3,8]</td><td>Spray precoat
Min. setting time: 2 weeks
AND embedded fiberglass mesh according to § 3.3.1.3.</td></tr>
<tr><td>Lightweight lime cement base coat (leveled, knocked down)</td><td>Pretreatment not required[6], only an embedded fiberglass mesh according to § 3.3.1.3.</td></tr>
<tr><td>Lime cement insulating plaster – Perlites (leveled, scraped)
Lime cement insulating plaster – EPS (leveled, scraped)</td><td>Spray precoat
Min. setting time: 2 weeks
AND embedded fiberglass mesh according to § 3.3.1.3.</td></tr>
<tr><th colspan="3">SPECIAL PLASTERS</th></tr>
<tr><td colspan="3">Follow manufacturer’s instructions.</td></tr>
</table>

3) Finish plasters made from silicate or silicone require a bonding coat and always a primer when applied to insulating plasters and coarse lime cement plasters.
6) In manual applications a cement spray precoat is required.
7) If board thickness > 5 cm, a cement spray precoat is required – setting time 3 weeks

8) Recommended particulate size of finish coat min. 2 mm
9) Finish plasters made from synthetic resins require a bonding coat and always a primer on coarse lime cement plasters. **They are not recommended for lime cement insulating plasters.**

Application Table F: Plaster Design for Cement-bonded, Multilayer Wood-fiber Insulation Boards in ICF Systems

<table>
<tr><th colspan="3">INTERIOR PLASTER – One-coat Plaster</th></tr>
<tr><th colspan="2">Types of Plaster</th><th>Plaster Base Pretreatment and/or Additional Measures</th></tr>
<tr><td colspan="2">Gypsum plaster (smooth finish)
Gypsum lime plaster (smooth & float finishes)
Lime gypsum plaster (float & smooth finishes)</td><td>Pretreatment not required,
but an embedded fiberglass mesh
according to § 3.3.1.3.</td></tr>
<tr><td colspan="2">Lightweight gypsum plaster (smooth finish) ->
Gypsum insulating plaster (smooth finish) -></td><td>---
not recommended on these plaster bases!</td></tr>
<tr><td colspan="2">Lime plaster (float finish)</td><td>Embedded fiberglass mesh
according to § 3.3.1.3.</td></tr>
<tr><th colspan="3">INTERIOR PLASTER – Multicoat Plaster</th></tr>
<tr><th colspan="2">Plaster Design
Base Coat / Finish Coat</th><th>Plaster Base Pretreatment and/or Additional Measures</th></tr>
<tr><td>Lime cement plaster
(leveled, scraped, knocked down)</td><td rowspan="2">Gypsum plaster
Gypsum-containing plaster
Lime cement plaster
Lime cement finishing plaster
Lime plaster
Silicate plaster[3]
Synthetic resin plaster[9]
Silicone plaster[3]</td><td>Cement spray precoat
Min. setting time: 2 weeks
AND embedded fiberglass mesh
according to § 3.3.1.3.</td></tr>
<tr><td>Lightweight lime cement base coat (leveled, knocked down)</td><td>Pretreatment not required,[6]
only an embedded fiberglass mesh according to § 3.3.1.3.</td></tr>
<tr><td colspan="3">Lime cement insulating plaster
Perlites (leveled, scraped) ->
Lime cement insulating plaster
EPS (leveled, scraped) ->
Not recommended on these plaster bases!</td></tr>
<tr><th colspan="3">EXTERIOR PLASTER</th></tr>
<tr><th colspan="2">Plaster Design
Base Coat / Finish Coat</th><th>Plaster Base Pretreatment and/or Additional Measures</th></tr>
<tr><td>Lime cement plaster
(leveled, scraped, knocked down)</td><td rowspan="2">Lime cement plaster[8]
Lime cement finishing plaster[8]
Silicate plaster[3, 8]
Synthetic resin plaster[8, 9]
Silicone plaster[3,8]</td><td>Cement spray precoat
Min. setting time: 2 weeks
AND plaster reinforcement
according to § 3.3.1.3.</td></tr>
<tr><td>Lightweight lime cement base coat (leveled, knocked down)</td><td>Pretreatment not required[6],
only an embedded fiberglass mesh according to § 3.3.1.3.</td></tr>
<tr><td colspan="3">Lime cement insulating plaster
Perlites (leveled, scraped) ->
Lime cement insulating plaster
EPS (leveled, scraped) ->
Not recommended on these plaster bases!</td></tr>
<tr><th colspan="3">SPECIAL PLASTERS</th></tr>
<tr><td colspan="3">Follow manufacturer’s instructions.</td></tr>
</table>

3) Finish plasters made from silicate or silicone require a bonding coat and always a primer when applied to insulating plasters and coarse lime cement plasters.
6) In manual applications a cement spray precoat is required.
8) Recommended particulate size of finish coat min. 2 mm
9) Finish plasters made from synthetic resins require a bonding coat and always a primer on coarse lime cement plasters. **They are not recommended for lime cement insulating plasters.**

Other Guidelines by the Austrian Plaster Association

Allgemeine Bedingungen für Putzarbeiten mit Werkputzmörtel.
General Conditions for Working with Pre-mixed Plasters.
3rd edition, February 1994

Richtlinien für das Putzen auf Polystyrol-Extruderschaumstoff XPS-R (mit rauher Oberfläche) als Wärmebrückendämmung.
Plastering Guidelines for Plastering on Extruded Polystyrene Insulation XPS-R (with coarse surface) as Cold Bridge Insulation.
1st edition, February 1993

Leistungspositionen für Putzarbeiten – Musterleistungsverzeichnis
Project Specifications for Plastering Work - Sample Guideline Specifications
1st edition, April 1994

ÖNORM Standards that are quoted in the Application Guidelines

ÖNORM	Name	Edition
B 2206	Mauer- und Versetzarbeiten – Werkvertragsnorm *Masonry Work – Project Specification Guidelines*	05/92
B 2207	Fliesen-, Platten und Mosaiklegearbeiten - Werkvertragsnorm *Working with Tiles, Plates and Mosaics – Project Specification Guidelines*	07/75 + 95
B 2209	Bauwerksabdichtungen – Werkvertragsnorm *Waterproofing of Building Structures – Project Specification Guidelines*	10/91
B 2210	Putzarbeiten – Werkvertragsnorm *Plastering Work – Project Specification Guidelines*	11/93
B 2211	Beton- und Stahlbetonarbeiten – Werkvertragsnorm *Concrete and Steel Reinforced Concrete Work – Project Specification Guidelines*	07/86
B 2223	Tapetenarbeiten – Werkvertragsnorm *Wallpapering – Project Specification Guidelines*	10/85
B 2230	Teil 2: Malerarbeiten; Anstrich auf Mauerwerk, Putz, Beton und Leichtbauplatten – Werkvertragsnorm *Part 2: Painting: Surface Treatments of Masonry, Plaster, Concrete and Lightweight Boards – Project Specification Guidelines*	03/75
B 3321	Teil 1: Gips für Bauzwecke – Begriffsbestimmungen u. Kennzeichnung Teil 2: Gips für Bauzwecke – Anforderungen, charakteristische Eigenschaften u. Prüfungen *Part 1: Building with Gypsum – Terminology and Definitions* *Part 2: Building with Gypsum - Requirements, Characteristic Properties and Testing*	06/73 08/74
B 3340	Fertigmörtel für Putzzwecke – Anforderungen u. Prüfungen *Pre-mixed Mortars for Plastering – Requirements and Testing*	12/77
B 3346	Putzmörtel – Regeln für die Verwendung u. Verarb. *Plasters – Guidelines for Application and Installation*	11/93
B 3350	Tragende Wände – Berechnung, Bemessung und Ausführung *Load-bearing Walls – Calculations, Measurements and Installation*	01/94
B 3414	Fertigputze mit Gips als Bindemittel – Richtlinien für die Verab. *Pre-mixed Plasters with Gypsum – Application Guidelines*	05/83
B 6122	Textilglasgitter für Außenwand-WDVS aus Polystyrol-Partikel-Schaumstoff und Dünnputz *Fiberglass Mesh for Exterior WDVS with Polystyrene Particle Foam and Thin-coat Plaster*	12/88

