THE IMPORTANCE OF CHAPISCO IN THE ADHESION OF THE COATING

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ABSTRACT

The search for agility and cost reduction in constructions can compromise the integrity of the coating system when the base preparation layer is suppressed, without taking into account its importance in the adhesion of subsequent layers. The elimination of this layer can result in future problems in the coating system, due to the lack of adhesion between the base and the plaster or single mass. Thus, this article aims to highlight the relevance of roughcast as a base preparation layer and the need for its proper application to ensure the efficiency of the coating system. The low quality of buildings built in the last two decades is due to failures in design, execution and maintenance, compromising the habitability, safety and durability of the buildings. The reduction in useful life is aggravated by failures that affect stability and functionality, such as structural problems or problems in vertical seals, directly impacting the performance and durability of buildings.

Keywords: Adherence. Mortar. Construction. Chapisco. Base preparation.

INTRODUCTION

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Problems in mortar coatings, especially cracks, are common and result from factors such as improper designs, low-quality materials, unprepared labor, failures in execution, and insufficient maintenance. This highlights the need for a thoughtful and integrated approach at every stage, from design to maintenance, to ensure the quality and durability of coatings.

The NBR 15575 (2024) performance standard establishes strict criteria to ensure the durability and performance of building subsystems, including vertical seals, which often receive mortar-based coatings. Among the performance requirements, the limitation of the appearance of cracks and detachments in the adhered coatings stands out, stipulating that these manifestations must not exceed 5% of the total area of the building's external facades.

These pathologies represent serious problems, as they compromise the ability to protect against water infiltration, reducing the durability of the construction. In addition, the lack of adhesion generates additional concerns related to safety, due to the risk of materials detaching, which can cause accidents with people in the vicinity of the building. Thus, compliance with the requirements of the standard is essential to ensure the quality, durability and safety of buildings.

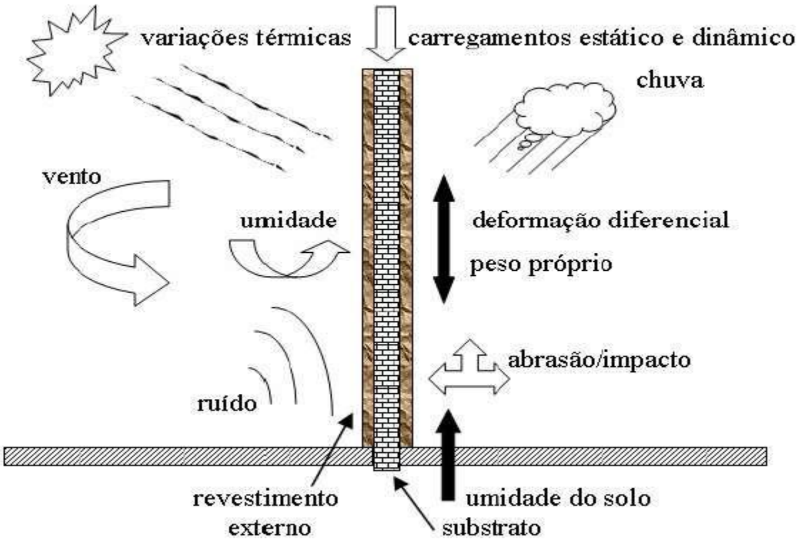
It should be noted that the coating system, as defined by NBR 13529 (2013), consists of a set formed by the mortar coating and the decorative finish, both of which are compatible with the characteristics of the base, the exposure conditions, the finish and the performance specified in the project. The mortar coating plays a crucial role in this system, being composed of successive layers: roughcast, plaster and plaster (or single mass). Each of these layers must have specific properties, capable of guaranteeing the proper performance of the system, ensuring the effective protection of the structure.

Among the layers of the coating, the roughcast is the first and has the function of ensuring the anchorage of the subsequent layers. According to NBR 13529 (2013), roughcast is defined as "the layer of preparation of the base, applied continuously or discontinuously, in order to standardize the surface in terms of absorption and improve the adhesion of the coating". Thus, in the absence of adequate preparation of the base with the roughcast and, consequently, the necessary adhesion, the plaster or the single mass, in addition to performing their specific functions, also need to assume responsibility for anchoring in the substrate. This makes them vulnerable to problems such as shrinkage and loss of mortar strength.

The performance of coating mortars is directly linked to several factors related to production conditions, the exposure environment and interaction with users. According to

Cincotto (1995), these factors are classified as extrinsic, which refers to the external stresses acting on the coating system, as illustrated in Figure 1, and intrinsic, related to the physicochemical properties and characteristics of the materials that make up the coating systems.

Figure 1: Stresses imposed on building surfaces. (LEAL, 2003).



Several pathological manifestations have been identified in these systems, among which the following stand out: loss of adhesion to the substrate, low tensile strength, occurrence of cracks induced by thermal and/or hygroscopic stresses, dimensional retractions and disaggregation of constituent materials. Such failures can cause significant material damage and, in extreme situations, represent a risk to the physical integrity of users, especially in large buildings with extensive façade surfaces. In addition, these problems compromise the credibility of the construction sector in the eyes of society.

In the search for cost reduction in the works, it is essential to consider the quality of the product. According to Segat (2005), cost reduction often compromises the quality of the coating system, promoting the reduction of layers, such as the elimination of roughcast, which disregards the importance and function of each one of them. As a consequence, the coating system does not meet the minimum performance required, which can lead to the emergence of future pathologies.

For the performance of the cladding system to be efficient, it is essential that there is a façade cladding project, which includes the specifications of the materials, the methods of execution and the layers to be applied. In addition, it is necessary to consider the environment and the characteristics of the substrate where the coating will be applied, such as ceramic or concrete block masonry, concrete structures, among others, ensuring that the properties of the mortar and the adhesion necessary for anchoring the coating are properly ensured. In this context, the present work aims to deepen the theory of the role of roughcast in relation to adhesion, highlighting its importance in civil construction (CEOTTO, BANDUK and NAKAMURA, 2005, p. 17; BAÍA AND SABATTINI, 2008).

One of the properties that influence the quality of the mortar coating is adhesion. According to Baía and Sabbatini (2008), adhesion is the ability of the coating to remain fixed to the substrate, regardless of its nature. Bauer (1994) explains that adhesion occurs when there is penetration of cement cream into the pores of the base (micro-anchoring), with the consequent hardening, or by the effect of mechanical anchoring of the mortar in the recesses and protrusions of the base (macro-anchoring). Therefore, it is essential that the pores of the base or layers are open, preventing the mortar from being overly smoothed to maintain its rough appearance. However, substrates with excessive porosity can compromise the anchorage of the coating, negatively affecting its performance.

The main responsible for providing adhesion to the coating system is the roughcast. According to NBR 7200 (1998), its application must be carried out in such a way as not to exceed 5mm in thickness, in order to avoid efforts that may compromise the adhesion of the coating. In addition, roughcast should be applied when the surface has poor adhesion or does not have sufficient roughness. In this way, it improves surface characteristics and increases adhesion resistance. (CANDIA and FRANCO, 1998; YAZIGI, 2009; BAUER, 1994).

Conventional roughcast, also known as common roughcast, is usually prepared with a 1:3 ratio (Portland cement, coarse sand and water), and may include adhesive additives such as PVA (Polyvinyl Acetate) or acrylic, depending on the type of block (ceramic or concrete). Its application consists of spreading the mortar with energy, covering the entire base, using a trowel or a mechanical sprinkler.

Industrialized roughcast, according to ABCP (2002), is prepared from a mixture of industrialized mortar in bags, to which only water is added, according to the amount specified by the manufacturer. For the application of industrialized roughcast, a toothed planer is used, forming 8mm grooves. In the case of rolled roughcast, a roller with an acrylic texture is used. It is important to ensure that the mortar of the rolled roughcast has a consistent consistency, similar to a semi-viscous paint. In addition, it should be checked whether the application of the roller results in a rough layer, and not in a smooth and well-adhered film. (FIORITO, 2009).

Candia and Franco (1998) proved that the variation in adhesion strength is directly related to the type of substrate and the base preparation adopted. Traditional roughcast stands out from other types, as it significantly improves the characteristics of the base. Although it is the technique that requires the most time and care in execution, due to the fact that its preparation is done on site by the builders themselves, it is the best option for ceramic block substrates, providing better adhesion for subsequent layers. On the other hand, for concrete structure substrates, it was found that only industrialized roughcast has good performance because of slimmer structures with concretes with compressive strength of 30 to 35MPa, use of materials, cements and additives that have lower porosity.

THE POROUS STRUCTURE OF SUBSTRATES

The substrates usually used in Brazilian civil construction, such as ceramic blocks, concrete blocks and surfaces of reinforced concrete structures, have significantly different internal structures. Although all of these materials are considered porous, the morphology and distribution of the pores vary substantially between them, directly influencing critical performance parameters such as initial adhesion, adhesion, and anchorage of the coating layers.

According to Corrêa (1999), the term substrate refers to the surface on which the coating will be applied, regardless of whether it is previously plastered. The term base, on the other hand, applies to the surface that requires specific preparation to receive the coating system, such as roughcast.

The classification of substrates can be carried out based on different criteria: by the type of material (ceramic, concrete, etc.); by function (structural or sealing); by the capacity to absorb water; by porosity; and by the surface texture (smooth or rough). Such characteristics directly influence the adhesion behavior and the overall performance of the applied coating.

The water absorption capacity of the substrate, as well as its absorptivity, are parameters widely analyzed in studies that seek to model the behavior of the coating system. For the adhesion of the mortar to be effective, the substrate must have adequate surface characteristics, such as flatness and a homogeneous water absorption rate along the surface.

Several studies have sought to correlate substrate properties, such as water absorption and surface roughness, with the final performance of the coating. Among these properties, the Initial Rate of Absorption (IRA) is one of the most used parameters to evaluate the behavior of the substrate in terms of interaction with the coating. The test for determining the IRA is regulated by the American standard ASTM C-67 and is technically equivalent to the concepts of Initial Rate of Suction (IRS) and the Haller Index. (LEAL, 2003).

It is important to note that ARI values can vary significantly depending on the type of substrate analyzed. In addition, significant variations are observed within the same batch of material, which compromises standardization and hinders quality control in the field. It should be noted that the author Scartezini (2002) identified IRA coefficients of variation between 20% and 25% for ceramic blocks and blocks, evidencing the high variability of the materials available in the market. This heterogeneity in absorption capacity makes it practically unfeasible to specify and use substrates with narrow water absorption ranges. Therefore, the control of the adhesion and performance of the coating system requires the correct selection and preparation of substrates, with special attention to the type of roughcast and the application conditions adopted on site. (LEAL, 2003).

PREPARATION OF THE BASE TO RECEIVE THE CHAPISCO

In order to optimize the adhesion strength between the substrate and the coating, it is often necessary to carry out a prior treatment of the surface, called base preparation. This process must be defined based on the specific characteristics of the substrate, being conducted with the use of appropriate materials and techniques that enable the creation of a surface with appropriate roughness and control of the initial water absorption. Such actions aim to favor the mechanical anchoring and uniformity of the adhesion of the coating mortar. (CANDIA, 1998; CARASEK, 1998).

The application of roughcast is widely recommended on external substrates, which are subject to greater mechanical stresses, as well as on reinforced concrete surfaces, due to the low roughness and porosity inherent to this type of base. However, indoors, the application of chapisco can be optional, especially when using ceramic blocks that already have satisfactory adhesion properties. Similarly, concrete blocks also demonstrate, in general, good anchoring capacity on internal surfaces, allowing, in certain situations, the dispensation of the roughcast.

In addition to the physical properties of the substrate, climatic conditions exert a significant influence on the behavior of roughcast and coating mortars. In regions such as Brasília, which have long periods with low relative humidity levels, which can reach values close to 10%, it is essential to adopt specific procedures that ensure efficient curing of mortars. The absence of protective measures against premature evaporation can compromise the hydration of the cement and, consequently, the adhesion and durability of the coating system.

1.3 WATER RETENTION IN MORTAR

This parameter directly influences the time available for the execution of the application, battening and straightening stages of the coating layer. Mortars with high water retention capacity, especially when applied on substrates with low absorption, tend to prolong the interval necessary for the start of these operations. This condition can compromise the productivity of the application and increase the susceptibility of the mortar to plastic shrinkage, which can result in loss of mechanical properties, due to greater exposure to evaporation during the plastic state. Considering the high amount of water present in the composition of the mortars, it is unlikely that there is sufficient water deficit to compromise the hydration process of the binders. Thus, the increase in tensile bond strength observed in mortars with high water retention may be associated with less water migration to the substrate and the environment, reducing the effects of plastic shrinkage and drying.

The normative method for determining water retention, as described in NBR 13277 (2005), has low sensitivity in detecting significant variations in this parameter, even when there are changes in the aggregate/binder ratio, in the lime/cement ratio or in the granulometry of the aggregates. Thus, the test has a predominantly comparative character, since the water retention capacity of mortars also depends strongly on the absorption characteristics of the substrate on which they are applied.

Détriché and Maso (1986), as cited by Leal (2003), identify the following factors as determinants of mortar water retention:

- Climatic conditions during curing, which influence the hygrothermal balance of the system;
- Physical nature of the mixture, including the proportion of binders and the fineness of the fraction of powdery materials, which determine the initial characteristics of microporosity;
- Chemical composition of the mortar, with emphasis on the type of binder used — hydraulic lime being a component with a high water retention capacity;
- Thickness of the coating layer, since the increase in thickness tends to favor retention.

In general, to increase the water retention of mortars, strategies can be adopted such as: increasing the lime content in the mixture; incorporation of specific additives with a water retention function; and use of additives that restrict capillary percolation, such as air-incorporating agents.

1.4 THE TRANSPORT OF WATER BETWEEN THE MORTAR AND THE SUBSTRATE

The movement of restricted water between the mortar in a fresh state and the porous substrate presents significantly higher complexity than that observed in the interaction with free water. This difference in behavior may justify the variability observed in experimental results that seek to correlate performance parameters of the coatings, since the real application conditions involve the presence of water retained in the mortar matrix and not in a free state. In this context, properties such as the water absorption capacity of the mortar, its water retention and the porosity of the materials are strongly interdependent and fundamental for the understanding of the mechanisms of movement and fixation of water in the coating system. The displacement of liquids in porous media largely depends on the microstructure of the material, including the diameter, distribution, and continuity of pores, as well as the physical properties of the liquid, such as viscosity and surface tension. (LEAL, 2003).

During application, the water contained in the fresh mortar acts as a transport medium for the dissolved cement compounds, which are transferred to the pores of the substrate, directly contributing to the establishment of chemical and mechanical adhesion between the layers. Several factors interfere with the flow of water between the mortar and the substrate, including: water content of the mortar, presence of retaining additives, thickness of the applied layer, use of lime or clay minerals, environmental humidity, porous microstructure of the substrate (size, shape and continuity of the pores), absorptivity and use of polymeric modifiers. (LEAL, 2003).

As soon as the mortar is applied to the dry substrate, a capillary flow of water from the mortar to the substrate begins, since the capillaries of the mortar usually have larger diameters than those of the substrate. This movement is driven by the difference in capillary potential, as described by Carasek (1996), and results in the compaction of the solid particles of the mortar and the immediate retraction of the applied layer, favoring the acceleration of cement hydration through the local increase in the concentration of ions.

In addition to the capillary movement towards the substrate, the evaporation of water into the environment occurs simultaneously. This process gradually reduces the water content of the mortar until all the interstitial water has evaporated. With the progress of hydration and the consequent refinement of the capillary network, the evaporation speed tends to decrease. Thus, the intensity and direction of water flows in the mortar-substrate system are determined by the distribution of the pores of the substrate, the water content of the mortar, the environmental conditions and the degree of progressive clogging of the pores of the mortar (PAES, 2003).

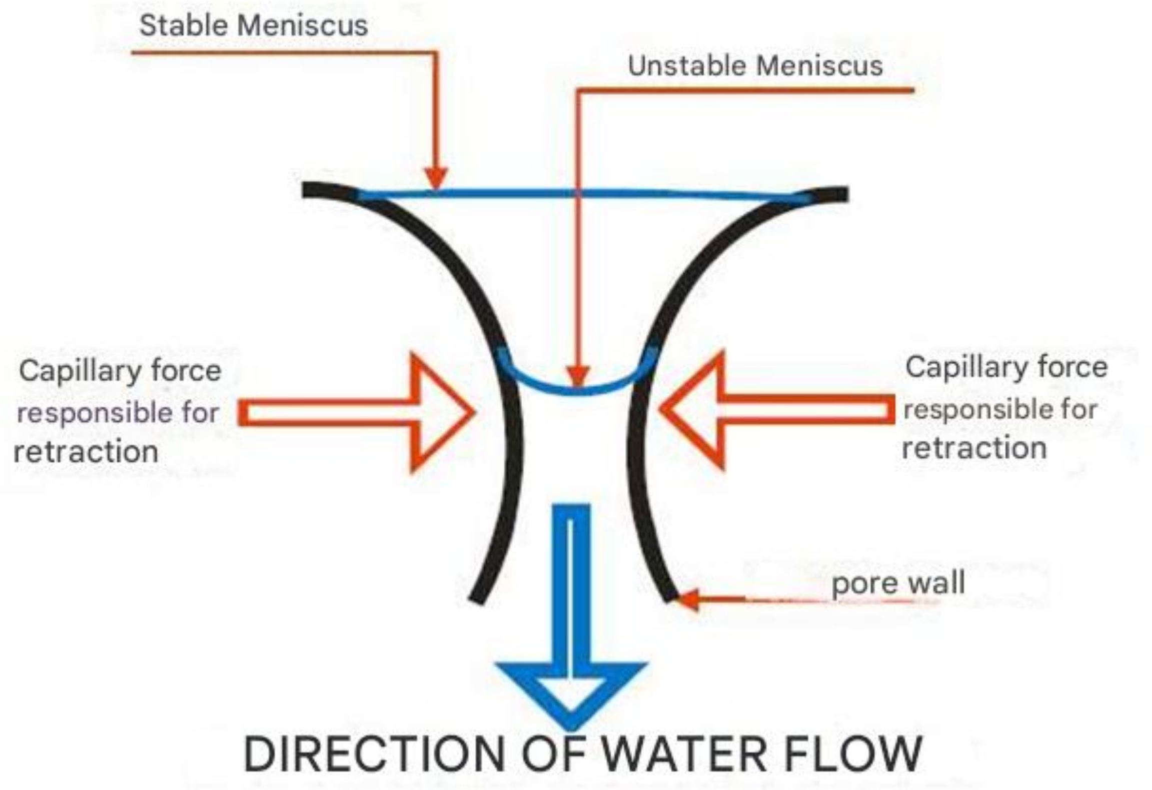
The absorption of water by the substrate presents temporal variation, being more intense in the first moments after contact with the mortar. This initial absorption favors the penetration of the cementitious paste into the pores, increasing adhesion. However, substrates with high absorption capacity can induce the formation of microcracks at the interface during the first few hours, due to plastic shrinkage, reducing effective adhesion.

This type of pathology can be mitigated through treatments to regulate the water absorption of the substrate, such as the application of roughcast or pre-wetting by sprinkling with a brush. However, the latter must be performed with discretion, as excess water can compromise the suction capacity of the substrate, impairing mechanical anchorage due to the low penetration of hydration products and, consequently, reducing the initial adhesion of the mortar (CARASEK, 2001).

Regarding cracking in mortar coating systems, it results from the interaction between mechanisms such as shrinkage, tensile strength and behavior of the constituent materials. Shrinkage, specifically, is caused by volumetric variations caused by multiple factors: water absorption by the substrate, evaporation to the environment, sedimentation, segregation, cement hydration and thermal variations.

Extrinsic factors such as temperature, solar radiation, relative humidity and wind speed intensify the shrinkage by drying. The water output of the paste generates the formation of menisci in the pores, which induce internal negative pressures. Plastic shrinkage occurs when the evaporation velocity exceeds that of exudation, and as this occurs before the mortar has developed sufficient mechanical strength, the capillary stresses exceed the capacity of the material, resulting in plastic cracking, as illustrated in Figure 2. (CORTEZ, 1999) apud (LEAL, 2003).

Figure 2: Capillary forces in retraction. CORTEZ (1999) apud LEAL (2003).



During shrinkage by drying, however, the coating already has a more consolidated microstructure and sufficient mechanical resistance to withstand the internal stresses generated by evaporation, which reduces the risk of cracking, although it does not eliminate it completely. (LEAL, 2003).

METHODOLOGY

This article was prepared based on the bibliographic research method, based on pre-existing sources and without direct practical application. According to Boccato (2006, p. 266), bibliographic research aims to develop solutions based on theoretical references already published, allowing analysis and discussions on these materials. In addition, it offers the researcher greater ease to access a wide range of information (GIL, 2002).

RESULTS

Pathologies in mortar coatings, with a special focus on cracks and adhesion failures. The analysis highlights the importance of an integrated approach from design to maintenance, involving detailed technical design, quality materials, proper execution, and preventive maintenance.

The NBR 15575 (2024) standard is used as a basis for performance requirements, reinforcing the limitation of pathological manifestations (such as cracks and detachments) in facades, which should not exceed 5% of the total area. The text also explores the NBR 13529 (2013) standard, which defines the coating system as composed of roughcast, plaster and plaster, and highlights the specific function of each layer, especially the roughcast, which ensures the adhesion between the substrate and the other layers.

The roughcast is treated in depth, with mentions to different techniques and materials used (conventional, industrialized and rolled), and with a technical basis of NBR 7200 (1998) standards and authors such as Bauer (1994), Candia (1998), Franco (1998), Fiorito (2009), the importance of the preparation of the base, type of substrate, and properties of the mortar for the proper performance of the system is emphasized, reinforcing that failures in this stage are directly linked to the emergence of pathologies. The efficiency of mortar coatings is strongly linked to the physicochemical characteristics of the substrate and the dynamics of the water during the first hours of mortar application. The porous structure of the substrates (ceramic blocks, concrete blocks and reinforced concrete surfaces), despite having different natures, plays a decisive role in the initial adhesion and final adhesion strength of the coatings.

It is important to note that water absorption tests are widely used to characterize substrates. However, the actual absorption during mortar application involves the movement of restricted water, which complexifies the direct relationship between the measured index and the effective performance of the coating. The significant variation of these indices within the same batch of blocks, for example, compromises the predictability of the system's behavior on site.

Base preparation treatments, such as roughcast and pre-wetting, proved to be essential to regulate absorption and create a surface favorable to adhesion. However, the effectiveness of these techniques depends on their correct application, considering the specific conditions of each type of substrate and the application environment. (ZANELATO, 2015).

In terms of results, it can be seen that:

- The high initial capillary absorption tends to induce early plastic retraction, leading to microcracks and loss of adhesion, especially in the first two hours after application.
- The evaporation of water into the environment and the consequent formation of stresses in the capillaries significantly influence the cracking process, both in plastic shrinkage and shrinkage by drying.
- The microstructure of the materials (size, distribution and continuity of the pores) is determinant in the kinetics of water transport and in the performance of the

mortar-substrate interface.

- The water retention of the mortar and the presence of additives are resources that can help mitigate the negative effects caused by overly porous substrates or very dry environments.

The results analyzed reinforce the importance of considering the system as a whole – substrate, mortar and environment – and not just isolated properties, to ensure the adequate performance of the coatings. Strategies such as the choice of compatible materials, specific substrate treatments and control of curing conditions must be carefully adopted to reduce pathologies and increase the durability of the coating system. (ZANELATO, 2015).

DISCUSSION

The NBR 15575 (2013) performance standard emerges as an essential normative instrument, as it establishes clear quantitative limits for pathologies on facades, such as the maximum percentage of 5% of the total area with detachments or cracks. This requirement drives the qualification of construction processes and the adoption of good execution practices, especially in the coating stages, which represent one of the most critical interfaces between technical performance and the aesthetic and functional perception of the building.

As established in NBR 13529 (2013), the mortar coating must be compatible with the characteristics of the base and the exposure environment. The segmentation in layers — roughcast, plaster and plaster — has a technical and functional role. The roughcast, specifically, is the first and most critical layer, as it is responsible for anchoring the system to the substrate. Its poor execution compromises the entire performance of the coating.

It is relevant to highlight that, in the practice of Brazilian civil construction, the elimination of roughcast for economic reasons has been one of the most recurrent causes of premature detachment of coatings, as pointed out by Segat (2005). This is a technical mistake that prioritizes cost reduction to the detriment of the quality and durability of the system.

The explanations of Bauer (1994) and Baía and Sabbatini (2008) show that adhesion is not an exclusively chemical phenomenon, but also a physical and mechanical one, being influenced by factors such as the porosity and roughness of the base, and the type of roughcast used. Micro and macro anchoring only occur effectively when the substrate has pores and irregularities compatible with the penetration and fixation of the mortar.

That is why substrates with high resistance and low porosity, such as concrete with Fck > 30 MPa, require the adoption of industrialized roughcasts, with additives and specific granulometry to ensure the required roughness and adhesion. Substrates such as ceramic blocks, on the other hand, are more porous and perform better with traditional roughcast, as long as it is correctly executed.

The comparison between traditional and industrialized roughcast reveals an important dilemma of modern construction: standardization and productivity versus adaptability and technical performance. Industrialized roughcast offers quality control, speed and less dependence on labor, which is advantageous in concrete structures with less roughness. However, its effectiveness in ceramic masonry is lower than that of traditional roughcast, which, although it requires more time and execution control, provides better adhesion and overall performance, as demonstrated by Candia and Franco (1998).

The discussion points out that the performance of the coating system cannot be detached from a holistic approach, which considers the adequacy of the project, the compatibility between materials, the qualification of the workforce, and the rigor in the execution. The roughcast, although often neglected, plays a decisive role in the durability and adhesion of the system and, therefore, must be carefully specified and executed.

The search for immediate savings through the suppression of essential stages of the construction process, such as roughage, results in higher future costs, both in terms of corrective maintenance and compromising the durability and safety of the building. Thus, it is recommended that engineers, architects and builders promote the appreciation of the coating layers, based on technical and normative criteria, ensuring quality, safety and performance to the building. The adhesion between mortar and substrate is a complex phenomenon, conditioned by several factors that act interdependently, especially with regard to the movement of water in the mortar-substrate system. As evidenced, the processes of capillary absorption, water retention, evaporation and clogging of the pores directly influence the formation of the binding interface and, consequently, the performance of the coating.

The literature highlights that the restricted water, present in the fresh mortar in contact with the substrate, has a different behavior from the free water measured in tests such as the IRA. This difference may explain the divergence of results between studies that correlate the performance of coatings with parameters obtained in isolation in the laboratory. Thus, the need for test methods that are more representative of the actual construction conditions becomes evident.

In addition, it is observed that the type and porosity of the substrate are determinants for the behavior of the interface. Substrates with high water absorption, if not previously treated (with chapisco or controlled pre-wetting), can induce early plastic shrinkage of the mortar, resulting in cracks and compromising adhesion. On the other hand, inadequate treatments, such as excess water in pre-wetting, can make it difficult for moisturizing products to penetrate the pores, impairing mechanical anchoring.

In addition, external factors, such as weather conditions (temperature, air humidity, wind and solar radiation), must be considered in the planning and execution of the coating. Regions with a dry climate and low relative humidity, for example, require greater attention to the curing of the mortar, in order to avoid excessive water losses through evaporation and the appearance of cracks.

Thus, it is evident that the quality of the coating is closely linked to the technical knowledge of the materials involved, to the control of the application conditions and to the correct preparation of the substrate. An integrated approach, which considers the physical, chemical and environmental aspects of the system, is essential to ensure the efficiency, durability and safety of mortar coating solutions.

CONCLUSION

The roughcast plays a key role in the adhesion of the coating, acting as an interface layer that improves the bond between the substrate and the coating mortar. Its correct application is essential to avoid problems such as detachments and cracks, which compromise the durability and performance of the construction. In addition, the proper choice of materials and the execution according to technical standards are decisive to enhance the efficiency of the roughcast, ensuring the stability of the coating system over time.

The quality of buildings is directly influenced by a combination of factors, including design adequacy, excellence in execution, and the implementation of an effective maintenance plan. The absence or failure in any of these steps results not only in the reduction of the durability and useful life of the buildings, but also in the compromise of their habitability and safety. In addition, the interdependence between performance requirements reinforces the importance of approaching constructions in a systemic way, ensuring that structural, functional, and durability aspects are considered in all phases of the building's life cycle.

It is important to highlight that the interaction between the coating mortar and the porous substrate is a dynamic and multifactorial process, in which the movement of water plays a central role, directly influencing the adhesion, durability and performance of the system as a whole. The complexity of the behavior of restricted water, in contrast to free water, highlights the importance of understanding the physicochemical mechanisms that govern capillary absorption, water retention and evaporation in the materials involved.

Water retention in coating mortars is a fundamental parameter to ensure the quality, durability and adequate performance of the construction system. Its influence extends from the workability and applicability of the mortar to its mechanical strength and adhesion to the substrate, and is therefore a critical factor during the execution phase. High water retention, although it benefits the hydration process of the binders, can compromise productivity and increase the risk of plastic shrinkage, especially in unfavorable environmental conditions or substrates with low absorption.

It is important to highlight that the method prescribed by NBR 13277 (2005), although useful for comparative purposes, has limitations in capturing the nuances of water retention in the face of variations in composition and application conditions. Thus, an in-depth understanding of the physical, chemical and environmental factors that affect this behavior becomes essential for the proper dimensioning of mortars and the choice of strategies that optimize their performance.

Therefore, the control of water retention must be treated in an integrated way in the process of formulation and application of mortars, considering not only the properties of the materials, but also the conditions of the environment and the substrate, in order to ensure safety, efficiency and durability to the coating solutions.

The proper preparation of the substrate, associated with the careful choice of mortar components and the control of environmental conditions during application and curing, is essential to mitigate pathologies such as retractions and cracks, promoting an efficient and lasting interface. Thus, the integrated understanding of the microstructural characteristics of materials, the behavior of liquids in porous media and the exposure conditions becomes essential for the design and execution of coatings with high technical performance and longer service life.

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