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cours

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Mortars

summary

1-Dosages of lime and cement mortars

2- Uses of mortars

1-Dosages of lime and cement mortars

Different proportions of lime and cement within mortar mixtures define their dosages, categorizing them into several types:

1 Standard mortar: Standard mortar, characterized by its ratio of one part binder to three parts normal sand by volume, embodies a meticulous balance that optimizes the interaction between the binder and the sand particles. This precise proportion ensures that the binder, be it lime or cement, adequately fills the interstitial spaces within the sand matrix. Consequently, when combining 1m3 of sand with 1/3 m3 of binder, the result is a singular cubic meter of mortar. The deliberate formulation of this mortar type facilitates an ideal amalgamation where the binder meshes seamlessly with the sand grains, creating a cohesive and workable mixture essential for various construction applications.

1-Dosages of lime and cement mortars

2 Lean mortar:

In the realm of mortar compositions, the lean mortar stands in contrast to its standard counterpart. In this specific blend, the quantity of binder incorporated is intentionally lower than the inherent volume of voids within the sand matrix. This deliberate reduction in the binder content relative to the sand voids fosters a mix that possesses a higher porosity. As a consequence, the resultant mortar exhibits a more granular and less adhesive nature compared to standard mortar. The intentional adjustment of this ratio influences the mortar's properties, rendering it suitable for specific construction applications where reduced adhesion and increased permeability might be advantageous

1-Dosages of lime and cement mortars

3, fatty mortar :

Fatty mortar, in contrast to its lean counterpart, incorporates a higher volume of binder relative to the voids present within the sand matrix. This deliberate adjustment results in a mortar mixture that exhibits increased plasticity and cohesion due to the surplus binder content.

When evaluating mortar characteristics, a commonly employed benchmark is the 1/3 mortar composition by weight, composed of one part cement and three parts standardized sand with particle sizes ranging from 80 microns to 2 mm. This particular formulation also includes 0.45 parts water. Following standardized procedures, this mortar blend is meticulously prepared in standardized metal molds, facilitating subsequent assessments.

1-Dosages of lime and cement mortars

3, fatty mortar :

The prepared mortar undergoes comprehensive testing, including rheological assessments, evaluations for setting time, and analysis of heat generated during hydration. Additionally, laboratory experiments utilize 4 x 4 x 16 cm prisms to conduct various tests, examining properties such as mechanical strength, shrinkage, swelling, capillary absorption, resistance to frost, and durability against aggressive water. These experiments provide essential insights into the performance and suitability of the fatty mortar for diverse construction applications, helping to ascertain its structural integrity, durability, and overall effectiveness in specific environmental conditions.

2- Uses of mortars

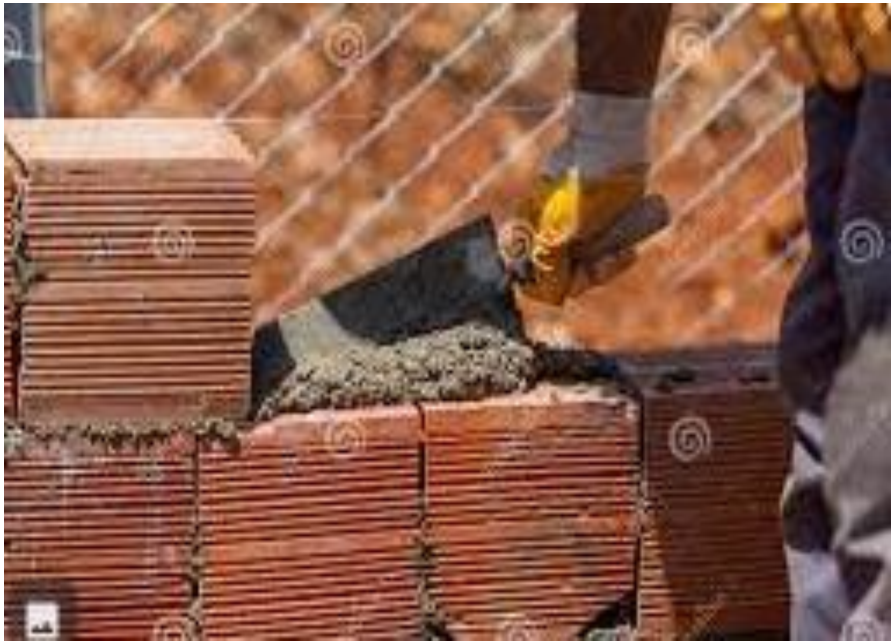
2- Uses of mortars 2.1. Masonry mortars

In the context of masonry mortars, the selection of appropriate materials and proportions is crucial. Typically, sands utilized in these mortars consist of grains that do not surpass 5 mm in size. The prevalent ratio often employed involves mixing one volume of binder, which could be hydraulic lime, cement, or a combination of both, with three volumes of sand.

The role of water in this mixture is significant yet challenging to establish beforehand. As a guiding principle, a quantity approximately half the weight of the binder is commonly adopted. However, this value is adaptable and can be decreased when incorporating a plasticizer.

2- Uses of mortars 2.1. Masonry mortars

The addition of a plasticizer serves to enhance the workability and adjust the consistency of the mortar, allowing for the reduction of water content without compromising its handling properties. This flexibility in water quantity accommodates variations in mortar application requirements, offering adaptability in achieving desired characteristics for specific masonry tasks.



2- Uses of mortars 2.2. Mortars for coatings

2.2.1. Role of the coating

In the realm of construction, mortars with hydraulic binders serve as coatings, playing a crucial role in both new constructions and the renovation of existing buildings. These coatings serve multiple functions pivotal to the integrity and aesthetics of the structure.

Firstly, these coatings act as protective layers, safeguarding the underlying structural components against adverse weather conditions. They form a shield that shields the construction from the detrimental effects of weather elements, thereby extending the longevity and durability of the building.

Simultaneously, while providing protection, these coatings serve as waterproofing agents.

2- Uses of mortars 2.2. Mortars for coatings

2.2.1. Role of the coating

They possess the capability to repel water, preventing its penetration into the structure, while also allowing the underlying surface to "breathe." This feature is essential as it maintains a balance, preventing moisture buildup within the structure while preserving its structural integrity.
Moreover, these mortars play a pivotal aesthetic role. They contribute significantly to the appearance and color scheme of the building, essentially dressing and defining the exterior facade. As the visible finish of the construction, these coatings enhance the overall visual appeal and architectural character, ensuring that the building not only withstands environmental challenges but also possesses an attractive and well-finished exterior.

2- Uses of mortars 2.2. Mortars for coatings

2.2.2. Execution of coatings

The execution of coatings involving cement mortars, lime and plaster, and aerial lime mixtures follows specific procedures aimed at achieving optimal application and performance: These coatings are typically applied in either three layers by manual application or mechanically through the use of a spraying machine. Alternatively, they can be implemented in two layers solely via mechanical spraying machines. Interestingly, in the latter method, the first and second layers of the former approach amalgamate into a single layer due to the distinct method of implementation.

2- Uses of mortars 2.2. Mortars for coatings

2.2.2. Execution of coatings

When applying three layers by hand or mechanical means, each layer serves a distinct purpose and contributes to the overall quality and functionality of the coating. However, when utilizing the mechanical spraying technique in two layers, the method merges the functionalities of the initial two layers into a singular, more consolidated application. This process streamlines the application while ensuring comparable effectiveness and performance to the traditional three-layer approach.

2- Uses of mortars 2.2. Mortars for coatings

2.2.2. Execution of coatings

Whether applied manually in multiple layers or through a more efficient two-layer mechanized spraying process, the coatings are meticulously crafted to adhere to structural surfaces while providing the necessary protection, waterproofing, and aesthetic enhancement. The selection of the application method often depends on project requirements, efficiency considerations, and the desired outcome for the specific construction or renovation project.

2- Uses of mortars 2.2. Mortars for coatings

2.2.2. Execution of coatings

-First bonding layer

The initial bonding layer within the coating process serves a fundamental role in establishing strong adhesion between the coating and the underlying support structure. This layer plays a crucial function in ensuring the cohesive integrity of the entire coating system.

Composed of a specific formulation, the bonding layer typically consists of 500 to 600 kilograms of cement per cubic meter (m3) of sand graded at 0/3 millimeters. The choice of cement is critical and often involves CPA - CEM I or CPJ - CEM type cement, specifically falling within the classification of 32.5 or 42.5.

2- Uses of mortars 2.2. Mortars for coatings

2.2.2. Execution of coatings

-First bonding layer

It's important to note that cements of class 52.5 and class R should be avoided in this context due to their differing characteristics that may not be suitable for this bonding layer. Furthermore, the sand utilized in this composition must contain minimal fine elements. This specification ensures that the sand promotes strong adhesion without impeding the bonding properties of the mixture. By using sand with fewer fine particles, the bonding layer achieves better compatibility with the subsequent layers of the coating, enhancing its overall effectiveness in adhering to the underlying support structure.

2- Uses of mortars 2.2. Mortars for coatings

2.2.2. Execution of coatings

-Second layer or body of coating

The second layer, often referred to as the body of the coating, plays a critical role in the overall functionality and aesthetics of the facade while ensuring waterproofing and surface evenness. Once the initial bonding layer has been applied, a waiting period of at least 48 hours is necessary before proceeding with the application of the second layer. This time interval allows for the proper setting and preparation of the initial coat.

The primary function of this second layer is twofold: to enhance waterproofing capabilities for the facade and to achieve a desired level of surface flatness.

2- Uses of mortars 2.2. Mortars for coatings

2.2.2. Execution of coatings

-Second layer or body of coating

The waterproofing aspect prevents moisture infiltration into the structure, ensuring its longevity and protection against environmental elements. Simultaneously, achieving a flat and even surface contributes significantly to the aesthetic appeal and overall finish of the coating.

Implementation of this layer involves re-wetting the bonding layer to prevent it from running or deteriorating, followed by the application of the mortar in multiple passes.

2- Uses of mortars 2.2. Mortars for coatings

2.2.2. Execution of coatings

-Second layer or body of coating

The number of passes may vary depending on the required thickness. Typically, an average cumulative thickness between 15 and 20 millimeters is achieved through these passes, ensuring a minimum thickness of 10 millimeters at any given point. This thickness criterion guarantees the necessary structural integrity and functionality of the coating while maintaining consistency in appearance across the surface.

2- Uses of mortars 2.2. Mortars for coatings

2.2.2. Execution of coatings

-Third coat or top coat

The third coat, often termed the top coat, finalizes the coating process, primarily focusing on aesthetic enhancement while also contributing to the overall waterproofing of the facade.

Following the completion of the second coat, a considerable waiting period of 4 to 8 days, at minimum, is necessary before applying the third coat. In specific cases, especially to achieve a uniform color, this waiting period might extend up to 15 days. Adjustments to these timelines might be needed in colder weather conditions or in environments with higher humidity levels to ensure optimal application and drying.

While the primary function of the third coat is aesthetic, it significantly influences the overall appearance and visual appeal of the facade.

Additionally, it contributes to the general waterproofing characteristics of the surface.

2- Uses of mortars 2.2. Mortars for coatings

2.2.2. Execution of coatings

-Third coat or top coat

The composition of the third coat typically involves an approximate ratio of 350 kilograms of binder per cubic meter of dry sand. The precise quantity of binder required may vary based on the type of binder used, such as cement, lime, or a combination thereof. This adjustment ensures the compatibility and optimal performance of the coating system with the specific type of binder chosen for the application.

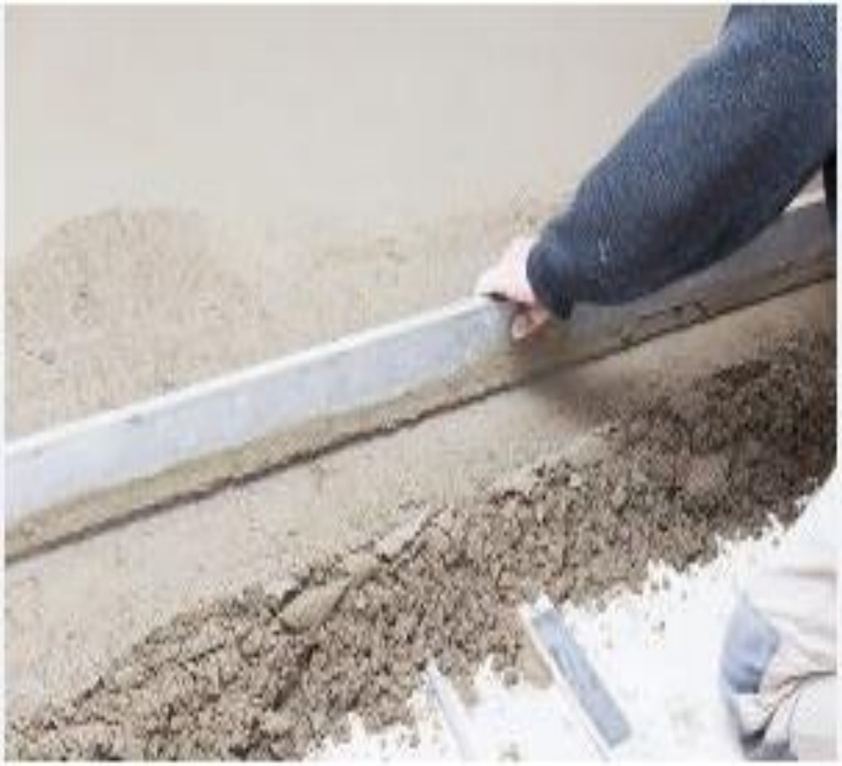
By focusing on achieving the desired aesthetic qualities while ensuring a level of waterproofing, the third coat not only enhances the visual appeal but also adds an additional layer of protection to the underlying structure, contributing to the durability and longevity of the facade.

2- Uses of mortars 2.3. Mortars for screeds

Mortars utilized for screeds play a crucial role in the construction of concrete floors, aiming to achieve a level, smooth surface while ensuring effective waterproofing.
In the construction of concrete floors, a screed is applied atop an initial layer of concrete. The composition of this first layer typically involves a mixture comprising 300 kilograms of cement for every 550 liters of dry sand (sized at 0/5 mm) and 730 liters of gravel ranging between 5 to 25 mm in diameter. This initial layer serves as a foundation for the subsequent screed.

2- Uses of mortars 2.3. Mortars for screeds

The screed, applied atop this base layer, usually attains a thickness of 3 to 4 centimeters. For optimal application, the surface upon which the screed is to be applied must be meticulously prepared. It should be clean, devoid of dust, possess a rough texture, and be heavily moistened while ensuring subsequent drying. This preparation ensures better adherence and facilitates the screed's bonding to the surface.



2- Uses of mortars 2.3. Mortars for screeds

Regarding mortar dosage for the screed, the recommended composition entails using at least 50 kilograms of cement for every 140 liters of dry sand. This specific proportion ensures the required consistency and properties essential for the screed to achieve the desired thickness and characteristics while maintaining its structural integrity and waterproofing capabilities. The meticulous preparation and precise dosage of materials in screed formulation contribute significantly to the quality and functionality of the final concrete floor, providing a flat, smooth surface with effective waterproofing, essential for various architectural and functional purposes.

2- Uses of mortars 2.4. Mortars for sealing

Mortars tailored for sealing purposes or finishing elements on concrete supports or masonry require specific characteristics to ensure their efficacy in such applications:

These specialized mortars necessitate rapid setting and hardening properties while ensuring minimal shrinkage or withdrawal upon application.

Various ready-to-use products are available for this purpose, designed to meet these stringent requirements. Alternatively, it is feasible to create a sealing mortar on-site, carefully crafting a composition that adheres to these specific characteristics.

2- Uses of mortars 2.4. Mortars for sealing

The formulation typically involves high-strength cements of class 52.5 or 42.5, known for their rapid hardening capabilities. Prompt cement and aluminous cement are also common components utilized in this mix.
The sand used in this formulation should ideally be very clean, preferably rolled, with a maximum particle diameter of 2 to 3 millimeters. To enhance specific properties, an expansive agent, along with a range of additives such as plasticizers, water retainers, accelerators, resins, and potentially fibers, might be incorporated.

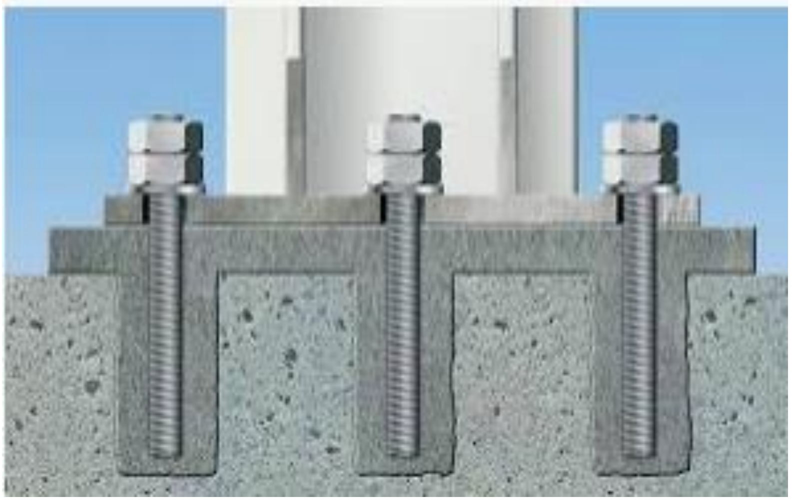
2- Uses of mortars 2.4. Mortars for sealing

The dosage of binders in these sealing mortars tends to be relatively high, often ranging between 600 to 700 kilograms for every cubic meter of sand. This higher proportion of binders contributes to the mortar's strength and rapid setting capabilities.

The quantity of water utilized must be meticulously adjusted to achieve the desired consistency, with the water-to-cement ratio typically ranging between 0.4 and 0.5. This precise adjustment ensures optimal workability without compromising the mortar's critical properties.

2- Uses of mortars 2.4. Mortars for sealing

This specialized mortar composition, carefully formulated with specific ingredients and adjusted dosages, ensures the efficient and effective sealing of equipment or finishing elements on concrete supports or masonry, meeting the demanding requirements of such applications.



2- Uses of mortars 2.5. Mortars for making a tiling screed

Mortars designated for creating tiling screeds, particularly those requiring a thickness greater than 3 centimeters, are specifically formulated to ensure an optimal surface for tiling while meeting certain criteria.

The composition of these mortars typically involves a combination of cement and sand. The dosage of cement ranges between 250 and 400 kilograms per cubic meter when mixed with sand graded at 0/5 millimeters. This particular combination ensures the requisite strength and consistency required for the screed, providing a suitable substrate for tiling applications.

2- Uses of mortars 2.5. Mortars for making a tiling screed

For the mortar to achieve the desired characteristics, it needs to have a slightly wet consistency during application. This moisture content aids in achieving a more uniform and regular surface, contributing to improved flatness and appearance of the screed. The slight moisture content enables better workability, making it easier to create a smooth and even surface necessary for subsequent tiling.

2- Uses of mortars 2.5. Mortars for making a tiling screed

Maintaining this balance of moisture content in the mortar is crucial, as it directly influences the workability and final appearance of the tiling screed. Achieving the appropriate consistency ensures not only the practicality of application but also contributes significantly to the visual and functional quality of the surface, allowing for successful tiling installations on top of the screed.

2- Uses of mortars 2.6. Mortar for waterproof coating

Mortars specifically designed for waterproof coatings, especially those applied to basement walls in contact with the earth, serve a crucial function in preventing water infiltration into the structure. The primary purpose of these waterproof coatings is to create an impermeable barrier that effectively prevents water from penetrating into the basement walls. These coatings are formulated to withstand moisture and create a protective layer, thereby safeguarding the structure against potential water damage and dampness.

2- Uses of mortars 2.6. Mortar for waterproof coating

The composition of these specialized mortars involves the use of high-quality cements, typically belonging to higher classes known for their enhanced strength and durability. Additionally, adjuvants are incorporated into the mixture to impart water repellent properties to the mortar. These adjuvants are specifically chosen for their ability to enhance the water-resistant characteristics of the mortar, further fortifying its ability to repel moisture and prevent water infiltration effectively.

2- Uses of mortars 2.6. Mortar for waterproof coating

By combining high-class cements with water-repellent additives, these mortars create a robust, impermeable layer when applied to basement walls, offering reliable protection against water ingress and ensuring the structural integrity and longevity of the building, particularly in areas prone to moisture exposure such as basements in contact with the earth.