

# The Importance of Waterproofing Structural Parts of a Building

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**Keywords**— *Water, waterproofing, Pathology, structures.*

**Abstract**— *A research is presented using information from articles, books, technical manuals dealing with the importance of waterproofing on the structural parts of a building. The research seeks to understand which methods are used for its application, which are the most common problems and mainly the causes. In order to elucidate the matter, a study was first carried out on the standard that regulates waterproofing in structures, as well as its importance, and the main processes to be used to solve the problems encountered. There was a lack of waterproofing projects and plans in the work, which consequently generate more costs at the end of the work due to its misuse or even its lack, as well as the types of moisture that affect the structures and which procedures to be taken in the beams, baldrames and slabs, important structures of a building. The number of pathologies related to water infiltration found in buildings is relevant and this brings great concerns for the future, as in a world that is constantly evolving in civil construction, it is absurd to have to see such an important step being relegated by responsible professionals. Its use must be precise and safe, as well as it must be accompanied by a qualified professional in the area, as the subject requires knowledge for the success of its application.*

## I. INTRODUCTION

The waterproofing of the structural parts of a building is of great importance for a project, because from this care, builders, architects, waterproofers, engineers and designers avoid exposing the structures to aggressive agents present in the atmosphere and weathering, providing a useful life larger [1].

It was found that the lack of attention to this process has caused pathology problems such as degradation of concrete, mortar and especially the corrosion of reinforcement, something of concern, as in addition to putting structures at risk, companies suffer from high maintenance values and recovery. It is important to point out that the damages also directly affect your credibility with the consumer, your company name and not least your image.

According to NBR 9575 of the 2010 [2], waterproofing can be considered as a set of operations and construction techniques, called services, which are composed of one or more layers, with the purpose of protecting constructions against the harmful action of fluids, vapors and moisture, that is, in addition to being important and provided for in a regulatory standard, its application in structural parts is essential, providing more safety and economy.

The purpose of the study is to show the importance of waterproofing, and to indicate that this process is not just a matter of compliance with a technical standard, but the performance of techniques that can represent improvements in project planning and execution, in addition to minimizing costs, considering the different types of waterproofing agents and the cost-benefit ratio.

## II. MATERIAL AND METHODS

This work was described through an exploratory research, based on theoretical information collected in technical norms and instructions established by Brazilian legislation, as well as bibliographical reviews and articles.

The stage started by searching for information that would help in the work to be developed, using books, articles, technical manuals, magazines and materials available on the internet.

The research is classified as qualitative, considering that its meaning and process are the main focus of the approach and that, [3] write the interpretation by the researcher with his opinions on the phenomenon under study is important, is also exploratory, considering that bibliographic research was carried out on the subject, addressing its techniques, standards and applications.

An analysis of the process of waterproofing structures was considered, seeking to characterize the importance and demonstrate the benefits of this technique used in civil construction, to increase the life of the structure, reducing maintenance costs and possible pathologies, by exposing structures without this treatment.

## III. RESULTS AND DISCUSSIONS

The process of waterproofing a structure aims to avoid the influence of water, responsible for triggering pathological problems. It is noteworthy that there is no "half" waterproofing or a simple waterproofing, as poor execution results in wasted money and time and, in the future, serious inconvenience with maintenance and recovery.

The purpose of waterproofing is to prevent the unwanted infiltration of water, fluids and vapors, which can drain or contain them. It was found that the waterproofing step has not received its due importance by engineers, architects, designers, waterproofers and builders, resulting in the triggering of various pathologies. The importance of waterproofing is linked to containing the processes of deterioration and degradation, since a large part of the materials that make up civil construction suffer from water and the presence of aggressive means in the atmosphere.

According to [1] water indirectly and directly is one of the biggest causes of pathologies due to the presence of moisture, where it divides them into infiltration moisture, rising damp, condensation damp, construction damp and Accidental moisture. The first one, Infiltration moisture that occurs when water mainly from rain passes from the external area to the internal area, occurring mainly in wall planes and in doors or windows. Ascending humidity is

characterized by the presence of water that comes from the ground and its presence is mainly noticed on walls and floors. Humidity by condensation appears when there is great humidity in the air and with surfaces that are below the temperature corresponding to the dew point, this element does not usually reach great depths of the elements. The dampness of the work usually occurs during its execution and ends up externalizing as a result of the balance that is established between material and environment. Last but not least we have Accidental Moisture which is caused by failures in piping systems such as sewage, drinking water and rainwater. Therefore, there are clear studies that water can influence structures in various ways.

In the [2] for a good waterproofing performance there are levels of projects to be followed: Basic Design and Executive Design.

The Basic Project aims to define areas to be waterproofed, define which viable system to be used, quantitative survey, performance study and cost estimation, it is noteworthy that the project must be executed together with the construction projects, such as structural, hydraulic-sanitary, architectural and others, as well as being executed by the same designer or responsible company, and this is fundamental, because according to [4] most of the designers develop complementary projects, and when they receive the plants with waterproofing indications can verify important interferences that the sooner they are verified, the smaller the error probabilities.

The Executive project goes deeper into constructive, specific and generic details that bring a waterproofing solution, however another important process within the project is the creation of descriptive memorials of materials, execution procedures and spreadsheets with quantities of materials and services. It is important to emphasize that the project must be ready in advance of the foundation's execution, that is, the advance must be prioritized to reduce the chances of problems with infiltrations (Figure 1).

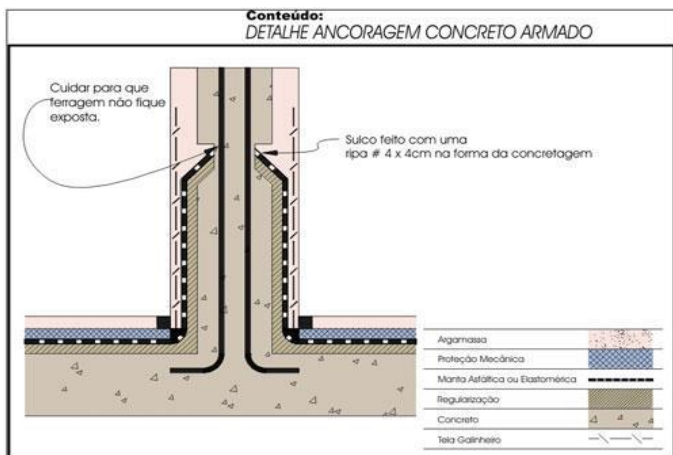


Fig.1: Detail Reinforced Concrete Anchor with waterproofing.

Source:[5]

Having a waterproofing project and planning is not just a matter of complying with a technical standard [2], but a matter of greater safety and economy, as well as a greater possibility of good execution, planning and inspection. According [4] it is not ideal to think that a single waterproofing method can have adequate functionalities for any type of work, it is understood then that each work is a different case and each different case is an adequate method, es a importance of a waterproofing project and planning (Figure 2).



Fig.2: Waterproofed Baldrame Beam.

Source: [6]

The application of a waterproofing layer on structural parts, especially on the baldrame beam, which is in direct contact with the soil (Figure 2), where it has high humidity. [7] corroborates by emphasizing that places in areas that have a humid climate with a high rate of precipitation can be harmful to the conservation of buildings, and this can be caused by the action of water that deteriorates the materials, caused by weathering,

which causes both physical and chemical wear, bringing serious problems with regard to corrosion of the hardware, putting all construction structures at risk.

Exposed slabs must be as important care as beam beams or any other structure, and because of their exposure, they need adequate treatment, such as applying an asphalt blanket, which according to [8] are uniform materials and easy to apply, becoming one of the most adopted systems in waterproofing works. However, there are cases where infiltrations still occur, explained by the lack of qualified professionals in the area, not putting into practice the correct execution. From this research, some pathological manifestations found in the buildings are highlighted, which need a better analyzed treatment, leading to discussions about possible ways to solve situations found in these places, in addition to the measures to be taken (Figure 3).



Fig.3: Waterproofing of exposed slab.

Source: [9]

There are several types of pathologies that can appear in constructions, referring to the lack of waterproofing, among them we have the manifestations caused by water infiltration, which according to [10] cause corrosion of reinforcement, concrete carbonation and efflorescence. Realizing that the biggest cause of problems in structures is water. Therefore, the importance of using waterproofing agents arises, a product so important that even so, it is often not used in construction works or even neglected by many professionals in the field of Civil Construction (Figure 4).



Fig.4: Pathologies arising from lack of waterproofing.

Source: [11]

To choose a waterproofing product, its cost-benefit must be taken into account, as there are several types of waterproofing products from different application methods and origins, and for an excellent result, the need for a preliminary study is very important. Implementing waterproofing in a building represents around 1 to 3% of the total cost of the work, as shown in Figure 5.

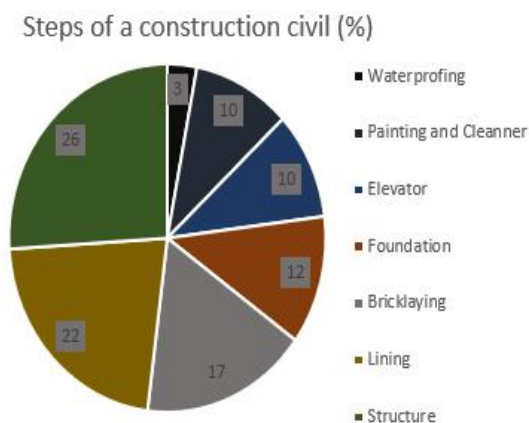


Fig.5: Description for steps a civil construction (%)

Source: Adapted [12].

[1] cited it is economical and easy to perform the waterproofing during the work, because from the moment that problems with moisture arise after the work is completed, the costs become higher, because all the complementary materials, such as ceramic floors and mortar end up being lost, that is, in addition to structural damage, there are damages with complementary materials. Costs for faults in the waterproofing system can generate re-watering costs of 5 to 10% of the total value of the work, therefore, it is cheaper to plan and design waterproofing systems.

It was observed that having planning and control, as well as monitoring by a professional specialized in the area along with the waterproofing process are essential factors and that for a successful success can never be neglected, as well as the study before the execution of the work, as This allows us to save on expenses, which can reach 15 times more than the expenses with the application of the product or waterproofing layer. Therefore, aiming at economy, comfort and safety, it is necessary to apply waterproofing to the structures.

#### IV. CONCLUSION

It was observed in this work that waterproofing is a critical point for the success of a construction and that the vast majority of related problems are related to the action on structures of different types of moisture.

There are many techniques, waterproofing materials and professionals, but many of these professionals are not adapted to this subject or many of them are neglecting the correct application, it is known that the cost of waterproofing is much lower, compared to the cost of re-watering, which it provides various problems in general.

Finally, waterproofing is part of the construction system of a work and for solutions to pathologies found, an in-depth study should be carried out for better results, thus providing success in the work.

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