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THE USE OF THE ACRYLIC SEALANT IN THE EFFECTIVE TREATMENT OF RETRACTING FIXES IN STRUCTURAL MASONRY IN THE CITY OF MANAUS-AM. (BRAZIL)

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ABSTRATCS

The present work describes the execution of the treatment using acrylic sealant in fissures of buildings constructed with a structural ceramic block in the city of Manaus-AM. The adopted method aims to show efficacy in the treatment of this type of pathology. Located near the line of the equator, region more affected by the rays of sun and in many times of the year with the temperature varying between 35º and 37º, factors that favor the appearance of cracks of retraction in the mortar bringing visual discomfort and often the devaluation in real estate, the appearance of cracks and fissures is very common in buildings in this region of the country. The retraction is nothing more than the volume reduction process that occurs in the cement mass due to the loss of excess water from the mixture by the evaporation process. The use of Acrylic Sealant aims to eliminate this problem and ensure that it ensures the desired long term result. It was observed from the appearance of the pathology after 30 days of external plaster applied, until 10 months after the treatment with the acrylic product and it was concluded that the use of this was effective and satisfactory, besides being easy to apply and to have low cost.

KEY WORDS: *Fissures, Acrylic Sealant, Pathology*

1. INTRODUCTION

The treatment of small and medium size is a challenge for companies in the field of construction, because what happens is a challenge to cause damage to a useful life of the structures. The masonry structure for development has not the sentiment, the survived, inteface, deveed bearing and movement the intensity of their weight and load of the date of foundations to foundations [1].

This constructive system has experienced expectancy in Portuguese, which should remove the costs of the knowledge and the search between companies, which look for the reduction of costs and a search and use of new materials [2]. Cracking is a pathological manifestation that can indicate a state of alert or the commitment of the task of preventing and eradicating the situation of a person with a disability [3].

This article presents an alternative for the treatment of retraction cracks, but it is one of the types of pathologies for the treatment with the studied product that can be a viable solution for the simple cracks and even for the cracks and cracks do not transform in

possible infiltrations they were implied in the useful life of the structures, giving better conditions for the durability of the property.

In order for the correct application of the product to be considered as one of the steps indicated on the package, a positive monitoring of the operation of the material is necessary.

The way the chart has been showing the outcome of the treatment of cracks at a certain level of residential structure, while all steps of the technique and the time of display after the completion of the service. The different ways of using the product were addressed, since the manufacturer's guidelines and recommendations and another, a way found by collaborating to give more agility in the execution of the activity.

2. LITERATURE REVIEW

2.1 CLASSIFICATION OF THE THICKNESS OF THE ANOMALIES

Fissures, cracks and cracks are pathological manifestations usually caused by tensile stresses on brittle materials such as concrete and ceramic materials. They occur when the materials are requested by an effort greater than their characteristic resistance, causing failure and causing an opening [4].

The apertures are classified according to their thickness in fissure, crack, crack, crevice or gap [5]. Table 1 shows the classification of the apertures according to their thickness.

Table 1 - Reference frame of the opening thickness and its classification

Anomalies	Openings (mm)
Fissure	Until 0,5
Crack	From 0,5 to 1,5
Surface Crack	From 1,5 to 5,0
Slot	From 5,0 to 10,0
Gap	Above 10,0

Source: Oliveira (2012, p. 10).

2.2 STRUCTURAL MASONRY STRUCTURAL MECHANISMS FOR STRUCTURAL MASONRY WALLS

All elements close to the building, either permanently or occasionally, can contribute to the appearance of pathologies that affect several elements of a building.

The most common mechanisms of crack formation in structural masonry walls are [6]:

- Foundation stress;
- Compression loading overhead;
- Thermal variation;
- Retraction;
- Hygroscopic movement;
- Chemical reactions.

2.3 RETRACTION IN THE COATING IN ARGAMASSA

It is the phenomenon where, after the handle, the concrete in contact with the environment suffers a reduction of its dimensions without the application of external loads, produced by the capillary forces. The contraction of the concrete mass will introduce tensile stresses to the part and consequently cracking [7].

The various factors are related to this type of fissure, among them the main ones are [8]:

- Incorrect dosing of binders such as cement and lime;
- Percentage of fines in the blend;
- Water content of kneading;
- Poor adherence between the mortar and the base (absence of slab);
- Inadequate thickness of mortar coating;
- Rapid loss of water to the environment during the hardening process due to wind and sunshine.

3. MATERIALS AND METHODS

3.1 TECHNICAL PREMISES

The technical assumptions of the activities developed in this work follow the manufacturer's instructions, taking into account the information listed on the product packaging in order to follow the instructions provided step by step.

3.2 CHARACTERISTICS OF THE STUDY

In the process of study and verification of the appearance of the anomalies, photo collections were created, but the part that stood out was the upper part of the facade because it was the area that caused the most visual discomfort. The house as already mentioned was all built in a ceramic block as shown in figures 1 and 2, after the laying of the masonry, the next step was the application of the slab and then finished with the plaster.

Figure 1 - Upper facade, right side

Source: Authors, 2018

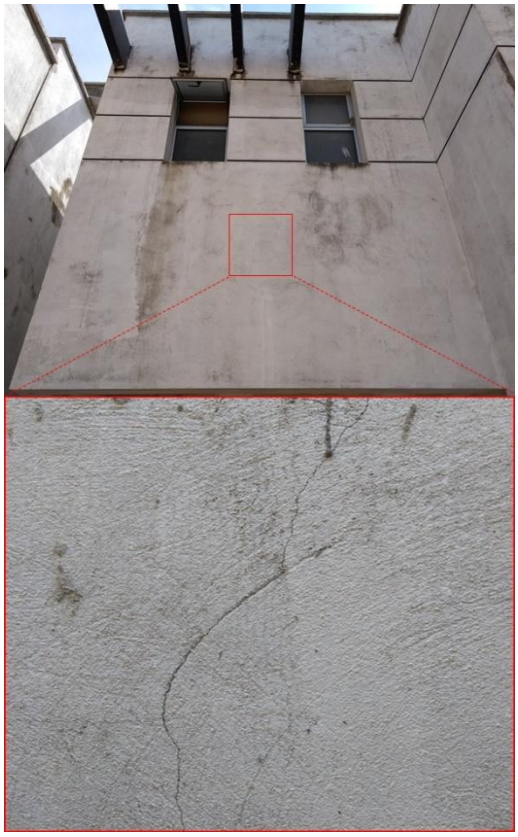
Figure 2 – Upper facade, left side

Sources: Authors, 2018

3.3 APPEARANCE OF THE ANOMALIES, VISTORY AND CHARACTERIZATION

The appearance of the anomalies occurred approximately after 30 days, even between the cement mass cure process, after that period the possible causes of cracks were verified by the specialist specialized in pathologies, and the final diagnosis was retraction, process of reduction of volume that occurs in the mass due to the loss of excess water from the mixture by the evaporation process. Figures 3 and 4 show the appearance of the anomalies still in the initial phase.

Figure 3 – Upper facade after 30 days, at the beggining of the appearance of the cracks, right side



Source: Authors, 2018

Figure 4 – Upper facade after 30 days, at the beggining of the appearance of the cracks, left side

Source: Authors, 2018

The white coloration occurs due to the application of a pigmented acrylic sealant shown in figure 5 which was used in an attempt to avoid a bigger problem due to climatic climatic conditions of the place, possibly causing possible infiltration of the structure.

Figure 5 – White acrylic sealer

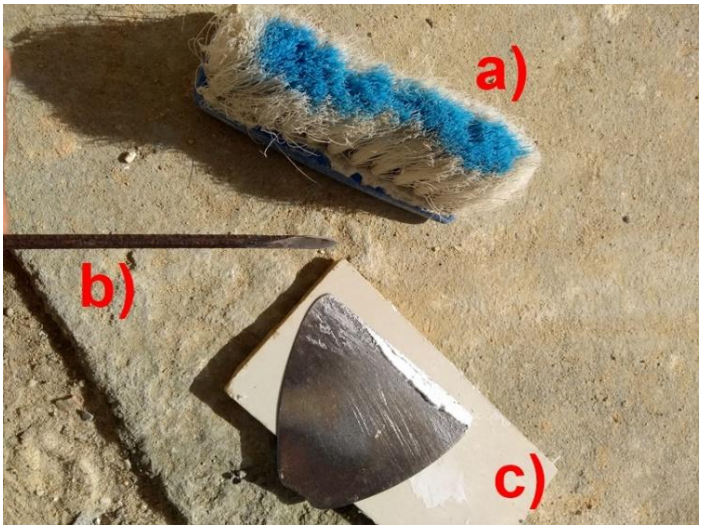
Source: Authors, 2018

3.4 EXECUTION AND PROCESS OF TREATMENT OF ANOMALIES

3.4.1 MATERIALS USED

The materials used for the use of this method were based on the information and instructions of the manufacturer informed on the product label. Figure 6 shows three fundamental tools for the process to be done correctly, they are: a) Bristle with soft bristles; b) 30 cm CA50, 5/16 "rebar with sharp tip; c) Stainless steel spatula used for regularization.

Figure 6 - Tools used to apply the product



Source: Authors, 2018

In this research was used the Sealant of the brand Sika - Acrylic Flexible Sealant, in the white color indicated for cracks and external and internal cracks (Figure 7). The option for this product is justified because it is the cheapest material found after market research carried out in the city of Manaus.

Figure 7 – Acrylic Sealant selected for research

Source: Authors, 2018

3.4.2 PRODUCT APPLICATION PROGRESS

The accomplishment of the service of application of the studied material occurred in three important phases, none of the activities was necessary technical training to the collaborators, only it was followed as informed by the manufacturer of the product, are simple but delicate steps to execute.

3.4.2.1 SCARIFICATION OF THE FISSURES

The first step is called fissure scarification, where a "V" shape risk is made about 3mm deep along the center of the anomaly, as shown in figure 8.

Figure 8 – Process of scarification of cracks

Source: Authors, 2018

3.4.2.2 SCARED SURFACE CLEANING

The next step is cleaning the scarified surface, which with the help of the brush the task is executed both at the center of the hole and around it, as shown in figure 9. The purpose of cleaning is to avoid as much dust from entering the slot created, helping the acrylic sealant adhere to the site more accurately and efficiently.

Figure 9 – Cleaning the scarification with a brush

Source: Authors, 2018

3.4.2.3 APLICATION OF THE ACRYLIC SEALANT

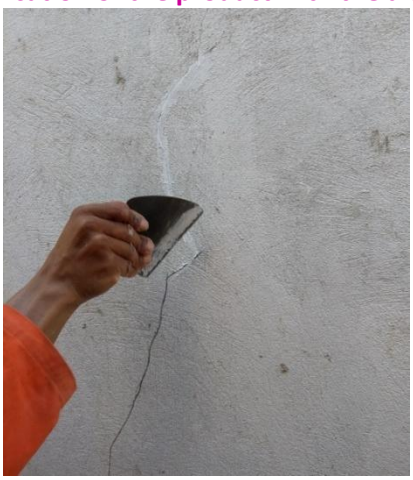
In the final step, where the product is applied in the already scarified fissure, a change in the method of performing the activity listed by the manufacturer on the product label has occurred. The manufacturer reports that the product should be applied with the aid of a hand gun used for the application of sealants as shown in figure 10, but it has been found that this method wastes a lot of time and material waste.

Figure 10 – Application of the product with the aid of a hand gun.

Source: Authors, (2018).

Then this process was replaced by the direct application of the sealant, depositing the product in the spatula and applying directly to the anomaly, it must be tightly tight against the sides of the crack to ensure a good adhesion, as shown in figure 11. This substitution in the execution of the service increased productivity and it was observed that the effect on the result was of excellence and satisfaction when compared to the previous method.

Figure 11 – Application of the product with the aid of the spatula



Source: Authors, 2018

3.4.3 PRODUCT STORAGE

This product should be stored in a covered, cool, dry and ventilated place, out of reach of children, animals and away from sources and heat.

4. RESULTS AND DISCUSSIONS

4.1 TREATMENT OBSERVATION AFTER 48 HOURS

The result obtained through the observation made after the application of the acrylic product showed a satisfactory result, the manufacturer informs that the curing time of the material is approximately 24 hours, but for greater safety in efficacy, the expected time after the application is executed until the sanding process and regularization of the site to the next stage of painting through pigmented texture was approximately 48 hours. Figure 12 shows the analysis of the treatment after waiting.

Figure 12 - Sample of cracks treated after 48 hours

Source: Authors, 2018

After a thorough observation and verification of the regularization of the masonry, it was observed that the place was able to receive the final step of the coating that in the case of this enterprise was used Acrylic Pigmented Texture. Attention must also be paid to the care after application of the material, in which case the curing time has been free from rain or any contact with water at the site of the anomalies. In photos 13 and 14 it is possible to observe the view of the upper façade 48 hours after the treatment.

Figure 13 - View of the upper façade 48 hours after the applied product, direct side

Source: Authors, 2018

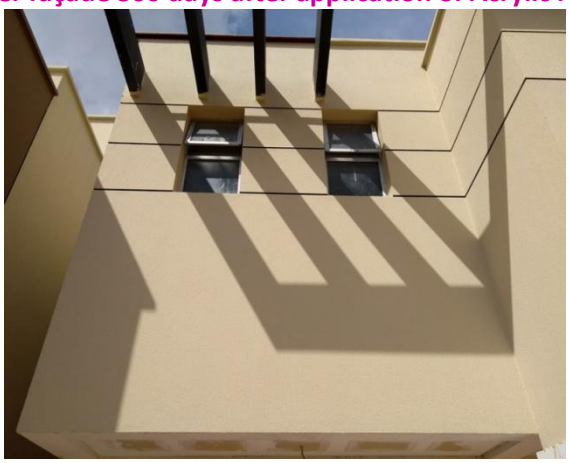
Figure 14 – View of the upper facade 48 hours after the product applied, left side

Source: Authors, 2018

IV.2 OBSERVATION OF TREATMENT AFTER 300 DAYS

After receiving a last coat of Hipercor acrylic sealant, the pigmented texture was applied after 72 hours and thus began a careful observation of the site every 30 days, during which time a collaborator was destined to perform the monthly inspection with the intuition to verify the behavior of the structure at the treatment site. At the end of the 10th month observed, the last month before the delivery of the property was observed a total efficiency of the product because the anomalies did not persist as shown in figures 14 and 15 proving that the method studied was a great investment option.

Figure 15 – View of the upper façade 300 days after application of Acrylic Pigmented Texture, left side



Source: Authors, 2018

Figure 16 – View of the upper façade 300 days after application of Acrylic Pigmented Texture, left side

Source: Authors, 2018

4.3 COST OF MATERIALS FOR IMPLEMENTATION OF THE SERVICE

In the table below you can check the quantity of materials and the unit cost. It is important to note that for this case studied the amount of Acrylic Sealant was 4 units, the product label informs that each refill fills 11 linear meters, however, for this research it was not possible to attest to the efficiency of the information.

Table 2 – Total cost of the material used in the survey

Material	Unit Cost	Amount	Total Value
Crylic Sealant Sika	R$: 16,00	4	R$: 64,00
Hand Gun	R$: 38,00	1	R$: 38,00
Plastic Brush	R$ 5,00	1	R$ 5,00
Stainless Steel Spatula	R$: 8,00	1	R$: 8,00
Rebar Rod CA50, 5/16''	Produced locally	1	R$: 0,00
		Final Price	**R$: 115,00**

Source: Authors, 2018

4.4 PRODUCT CHARACTERISTICS AND ADVANTAGES

1º - Easy to apply;
2º - Good adhesion in porous materials such as: mortars and concrete;
3º - Good finishing in the meetings between walls;
4º - For outdoor and indoor use;
5º - Good color stability;
6º - Can be painted and sanded;
7º - Good resistance to UV rays;
8º - In contact with skin, it can be washed and removed with soap and water.

5. CONCLUSION

Retraction fissures are pathologies that appear quite often in buildings in the city of Manaus, causing problems for both technicians and lay people due to the discomfort caused by them, in this work a treatment proposal was presented in case of appearance of these anomalies and when verifying the result after months of observation we conclude that the method meets the proposed purpose and brought satisfaction due to the cost benefit of the service. One of the main things observed during the study was the ease of application of the product, since it only needed to follow the information of the manufacturer without needing a course of improvement or something of the sort, on the other hand it is a very delicate service to conclude that it needs attention and careful at the time of execution, the final cost of materials was also a good point for this research, considering the method as low cost.

It is important to emphasize that for this work it was necessary to treat only the external part of the property, but the product also needs to be considered inside the buildings. The brand chosen for the survey was satisfactory considering that we had the option of 4 different manufacturers and after a market research that aimed at the low cost in the products offered was chosen by the Sika brand product. As only one manufacturer was used, we have no results on the others, so for future research a comparison of the efficiency between different manufacturers of this product could be made.

Finally, it is believed that the objective of this study has been achieved, and that it can contribute to the improvement of other works as well as to the treatment of other buildings in a similar situation, since it allowed to inform that pathologies such as these can to be fought without great costs, serving as an instrument for those who go through the same situation since at the beginning of this research we did not find documents that could aid in the information of similar cases in the city of Manaus.

6. ACKNOWLEDGMENTS

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