

CHAPTER 8

ANALYSIS OF THE APPLICATION AND EFFECTIVENESS OF THE REALIZA ANTICHAMAS PRODUCT

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ABSTRACT: Flame retardant products are substances or treatments applied to materials to reduce their flammability and slow the spread of fires. They are widely used in various sectors, such as construction, automotive, electronics and textiles, where fire safety is crucial. These products work mainly by forming a protective layer that isolates the material from heat and flammable gases, thus preventing the fire from spreading quickly. This study aims to carry out an analysis of

the Realiza Antichamas product to help control fires with a focus on the Amazon environment and its particularities. In addition to specific flame retardant materials, such as flame retardant fabrics, there are also additives that can be incorporated into polymers, being these: micro and macro crystals, carbohydrates polysaccharides and other materials to improve their fire resistance properties.

KEYWORDS: Fire; Flame retardant; Combat; Control; Burn;

ANÁLISE DA APLICAÇÃO E EFICÁCIA DO PRODUTO REALIZA ANTICHAMAS

RESUMO: Produtos antichamas são substâncias ou tratamentos aplicados a materiais para reduzir sua inflamabilidade e retardar a propagação de incêndios. Eles são amplamente utilizados em diversos setores, como construção civil, indústria automotiva, eletrônica e têxtil, onde a segurança contra incêndios é crucial. Esses produtos funcionam principalmente por meio da formação de uma camada protetora que isola o material do calor e dos gases inflamáveis, impedindo assim que o fogo se propague rapidamente. Este estudo almeja realizar uma análise sobre o produto da Realiza Antichamas no auxílio ao controle de incêndios, com foco no ambiente amazônico e suas particularidades. Além de materiais específicos antichamas, como tecidos retardantes de chama, há também aditivos que podem ser incorporados a polímeros, sendo estes: micro e macro cristais, carboidratos polissacarídeos e outros materiais para melhorar suas propriedades de resistência ao fogo.

PALAVRAS-CHAVE: Fogo; Antichamas; Combate; Controle; Queima;

INTRODUCTION

Flame retardant products play a crucial role in fire protection, especially in the countryside, where exposure to accidental fires can have devastating consequences for property, people and the environment. These products are designed to slow the spread of fire, providing valuable time for safe evacuations, firefighting and asset protection (CONDOTTA et al, 2015).

In agricultural and rural settings, where flammable materials such as hay bales, burlap, wood and chemicals are frequently present, flame retardants can be applied pre-emptively to reduce the risk of fire. They typically work in two main ways:

1. **Combustion Retardation:** Flame retardant compounds act chemically to reduce the rate at which treated materials burn. This means that if a fire does start, it will spread more slowly, allowing a quick and effective response before the fire becomes uncontrollable.
2. **Passive Protection:** In addition to slowing combustion, some products also form a protective layer that prevents fire from directly reaching the underlying material. This can be especially important in rural structures such as barns and sheds, where highly flammable materials are often stored (CARSON et al, 2008).

The choice of the appropriate flame retardant product depends on the type of material to be protected, local environmental conditions and applicable regulations. It is essential to consider products that are safe for the environment and human health, as well as effective in a variety of climatic conditions (LUMAY, 2012).

In summary, a flame retardant product is a vital preventative measure for reducing the risk of fires, protecting property, animals and human lives. Investing in fire protection technologies can make a significant difference in the safety and resilience of rural communities against fire-related disasters.

Realiza AntiChamas is a product that aims to ensure fire prevention/fighting in a sustainable and ecological way, presenting itself as an advantageous option in assisting fire departments, with specific action both in fighting forest fires, a recurring phenomenon in the state of Amazonas, as well as in fires of other natures.

OBJECTIVES

General

To address the process of using new firefighting technologies through scientific tests with the **Realiza Antichamas** product.

Specific

- To evaluate the amount of **Realiza Antichamas** product on the burning intensity and flame height of pre-selected materials;
- To verify the use of **Realiza Antichamas** regarding the effectiveness and efficiency of the product;
- To determine the degree of difficulty in handling the product;
- To compare the difference between the results with the usual and biotechnological firefighting techniques.

THEORETICAL FRAMEWORK

Reducing the spread of forest fires is extremely important for several reasons, all of which are crucial to safety, sustainability and the economy. According to Schumacher and Dick (2018), forest fires have several harmful effects. Some key points are:

- Damage to the soil;
- Production capacity of the forest or settlement;
- Recreational aspect of the forest;
- Wildlife;
- Vegetation;
- Protective nature of the forest;
- Atmospheric air;

- Various properties;
- Human life.

To meet the above points, effective strategies are necessary, which include proper management of vegetation around forest areas, the establishment of firebreaks, the use of products with flame-retardant properties, the use of irrigation techniques that reduce flammability, education on fire prevention and the development of robust and feasible emergency plans.

Collaboration between government authorities, production sectors and fire management experts, as well as the involvement of the local community, is essential to mitigate risks, minimize emissions and protect both the environment and human life. In this sense, the **Realiza AntiChamas** product, a water-soluble powder compound and presented for fighting fires in the form of a solution, presents itself as a solution to the problems highlighted.

METHODOLOGY

To represent and analyze the findings in the study, events related to the implementation of product application practices will be categorized through a participant observation stage that will generate qualitative data. Preliminary tests had already been initiated the previous year in the Federal District and in Goiás by the product's industrial team.

The data analysis aims to organize and summarize the data in such a way that it allows for the provision of answers to the proposed problem (GIL, 2008).

The content analysis techniques defined by Bardin (2011) and Minayo (2007) will be used to analyze the qualitative data. For these authors, the data analysis process involves several phases to obtain meaning from the data collected. Regarding the essential stages of content analysis, Bardin (2011) and Minayo (2007) use different terminologies, but similar in their actions.

Given this diversification and also due to the terminological approximation, Bardin (2011) and Minayo (2007) will be used as reference to describe the three phases of content analysis: pre-analysis, exploration of the material and, finally, the treatment of results, inference and their interpretation.

RESULTS

The practical activity of analyzing the application of the product under study was undertaken on July 4, 2024, in the burning yard of the company Preven Fire, located at Av. Colantino Aleixo, Puraquequara neighborhood, Manaus-AM, under strict supervision of professionals from CBMAM, CBMDF and the host company.

The weather conditions during the tests were measured with an analog weather station from Forest Suppliers (US Forest Service), with relative humidity of 55% at 11:30 am, the time of the tests; ambient temperature of 35.5°C; wind speed below 2 mph, blowing at the magnetic head of 130°.

Fire simulations were performed in two scenarios: wood and rubber, with the materials divided in the yard and grouped in pairs (case-control and test with the product). At 11:30 a.m., a standard burning of wood began, which was later extinguished with water. Then, another burning was carried out, this time with rubber, which was also extinguished with water. Then, the sequence was repeated, using the product Realiza AntiChamas to combat the fire.

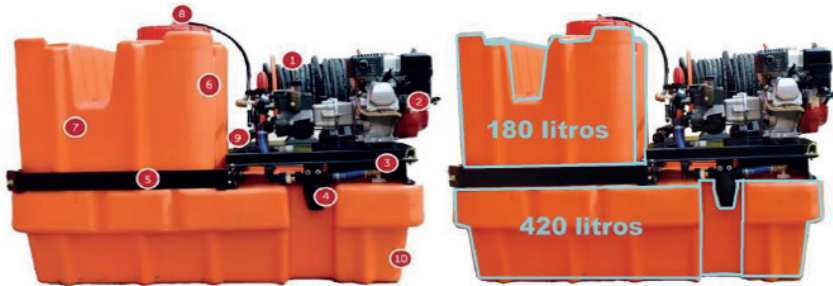
The burnings were initially fueled with a mixture of diesel and gasoline in a 5:1 ratio, using 5 liters of the mixture, placed on a bulkhead 40 cm below the arrangement of wood to set it on fire, and 1 liter on top of 5 tires for the same purpose. The timing of the initial exposure time to the fire was established at 4 minutes for the wood and 5 minutes for the rubber, allowing the flames to spread uncontrollably.

Once the initial exposure time to the fire had elapsed, in each of the four cases under study, the firefighting began, carried out by specialized military personnel from CBMAM, and the entire action (initial burning, combat and aftermath) was duly filmed, with the corresponding time recorder.

The firefighting aspects taken into consideration were: volume of liquid used to extinguish the flames and in the aftermath (pure water and Realiza Antichamas solution), time taken to extinguish the flames, density and extent of the smoke produced during the burning and, finally, the reignition of the sample.

The firefighting equipment used was the standard equipment used at the CBMAM, made by Guarany, with a gasoline engine and a capacity of 600 liters, similar to the one illustrated below:

TECHNICAL CHARACTERISTICS:



1. Reel attached to a metal support with 30-meter hose, rubber discharge hose with steel braid and support for reinforced reel.
2. 4-stroke engine coupled to pump and reducer
3. Protected suction hose
4. Filter built into the tank for greater protection
5. Rear fixing structure
6. Tank level sight glass
7. Rotomolded tank in high-resistance plastic with a design that provides a wave breaker function
8. Main filling nozzle and hydrojet for fast filling
9. Support for discharge lance on the chassis with discharge lance for full jet and spray
10. Tank drain

It should be noted that the emphasis of the study was on carrying out the procedures in an open environment to simulate the scenario of everyday life in the Amazon in a more realistic manner and that, for control purposes, the fights were first carried out with pure water, and then the **Realiza AntiChamas** product was added directly to the equipment tanks.



Pallets before the experience

A stacked pallet model was used in duplicate for supervised burning. In both cases, the burning lasted four minutes before interventions to extinguish the flames were initiated. The container below the pallets contained the diesel and gasoline mixture. The test also involved a duplicate experiment with arrangements of five tires and an initial burning time set at five minutes.



Tire stack for the experience

Observers from the company Preven Fire, safety engineers, members of the Court of Auditors of the State of Amazonas (TCE-AM) and military personnel from CBMAM received a questionnaire that was answered while completing their observations of field actions.

In the first test of the first battery (wood + pure water), for about 11 minutes and 30 seconds, the CBMAM firefighter used the water jet from the 600-liter pump to extinguish the flames. The fire reignited just 30 seconds after the flames had gone out. About 1 more minute and 30 seconds were needed with water to definitively control the flames.

In the test with tires, using pure water, there was a significant production of dark smoke and the fire was controlled in about 2 minutes and 50 seconds, with extensive melting and destruction of the tires. No reignition was observed, a fact associated with the excess water used in the operation. However, with induced reignition (using 1 liter of diesel/gasoline mixture), the flames returned to the levels prior to the firefight.



Fire test begins

The tests on the second set (water added with the Realiza AntiChamas product, in the proportion of 0.7g of the product per liter of water) revealed impressive results, extinguishing the flames in the wood arrangement in approximately 3 minutes and 50 seconds, approximately 7 and a half minutes faster than observed in the previous test.

It was also observed that there was no re-ignition, in addition to better structural preservation and integrity of the wood in the initial arrangement, compared to the structure in the first test, which was partially toppled. It is also worth noting that the observers were invited to touch the wood in the second pile, manually measuring the abrupt cooling, much greater than expected, immediately after the flames were extinguished, which eliminates the risk of burns by contact.



Structure well preserved

In the test with tires and firefighting with Realiza AntiChamas, the fire was extinguished in just 46 seconds, approximately 2 minutes faster than the conventional firefighting method previously tested. However, a small reignition occurred inside one of the tires, initially attributed to the lack of contact of the product with the rubber in that location, given the speed of the initial combat.

In induced reignition (using 1 liter of diesel/gasoline mixture), the flames resumed, but only in the areas where the fuel came into contact with the rubber, with the flames remaining at a low intensity and not spreading. After approximately two minutes of forced reignition, the flames generated were extinguished in just 1 second, using the product's liquid.



Tires burning

The pump of the pik up kit was operated by Corporal Raimunda Nunes, who was responsible for turning it on, off and changing the pressure levels as needed. During the first experiment (water only), the flame-fighting was conducted by 3rd Sergeant Dirley Souza on the pallets and tires. During the second experiment (water with the product), the combat was carried out by student soldier Matheus Portela on the wooden pallets. Corporal Dirley finished the second experiment by extinguishing the flames on the tires.

FINAL CONSIDERATIONS

The audience was impressed with the results obtained in the product demonstration compared to the demonstration of the conventional method, using only water. It can be inferred that Realiza AntiChamas fulfills its role as an ecological retardant/fighter, as we can see that the use of water can be reduced during the occurrences and the flames are extinguished in less time, generating less CO₂ emissions into the atmosphere and reducing heat emissions into the environment, since the flames are extinguished in less time, in addition to preserving the health of the firefighters involved.



Sample of the product

Again, it is observed that the firefighter wears out less and is also less exposed to occupational risks, since he spends less time controlling the flames, in addition to having a greater portion of the property preserved from fire damage.

The tests were conducted under the supervision of CBMAM firefighters, with the purpose of ensuring due protection for spectators/evaluators and efficiency in fighting the flames. It is worth noting that the product that is the subject of this study is primarily used as a flame suppressant (firefighting), which is the focus of the tests performed.

THANKS

3rd Sgt. Dirley Francisco de Souza – CBMAM Logistics Director, Bachelor of Mathematics, Specialist in Public Safety.

CB Raimunda Serrão Nunes – Director of Technical Activities (DAT), Graduated in Nursing, Specialist in Public Safety

Student Soldier Matheus de Almeida Portela – Training and Improvement Center for Enlisted Personnel (CFAP), Bachelor of Civil Engineering, Specialist in Fire and Panic Safety Engineering

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