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Protection of Wooden Materials Modern Methods

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Abstract: During the exploitation of wooden materials they are exposed to various impacts. At present, there are various methods of protection. Various modern methods of protection have been developed that meet the design requirements. The article provides information on modern methods of protection and the results of the analysis provided.

Keywords: Wooden materials, operation process, various impacts, conventional protection methods, design requirements, modern methods, ways to eliminate defects, analysis results.

Elements and structures made of wood are exposed to various influences during operation. As a result of these influences, defects of various sizes appear in them, their load-bearing capacity decreases, their service life is shortened, and they become unusable.

The main reasons for such situations are decay under the influence of various fungi, exposure to rodents, operation in unfavorable humidity conditions, prevention of flammability, etc.

Since the resistance of wood materials to the influence of various fungi largely depends on the type of wood and operating conditions, a number of constructive and technological methods have been developed and used to protect them from such influences, in recent years, cost-effective and effective modern methods have also been recommended [1,5].

When implementing the recommended modern methods, it is important to take into account the type of fungi present in the area and the materials used.

Based on the results of the analysis, it was determined that the most widespread type of fungus today is the house fungus of the type “marulius luakrimans”. In addition, the presence of “white”, “veil” and “plate” fungi was recognized. When protecting structures made of wooden materials, it is necessary to pay attention to their parts connected to the ground, stone and concrete, to apply protective measures and to use special types of modern antiseptics [3].

Modern antiseptics used for this purpose are mainly divided into 4 groups.

water-soluble, i.e., water-soluble ingredients;

pastes prepared on the basis of special ingredients that dissolve in water;

ready-made fatty compositions;

- antiseptic substances prepared using organic solvents.

Below we will consider the main features of the above-mentioned modern contents.

"Sodium fluoride" antiseptic in white powder form, which does not change the color of wood, does not affect its strength, does not corrode metal elements, dissolves 3.7% at 20°C and 4.0% at 80°C, is widely recommended today. Antiseptics of this type have been recommended as an

effective tool for protecting wooden structures in residential, industrial and production buildings, as they have a number of positive indicators.

In recent years, a white or yellowish-white powder with a light gray appearance called "sodium silicon fluoride" has been widely used, similar in its effectiveness to "sodium fluoride", with a solubility of 0.7% at 20℃ and 1.8% at 80℃. This antiseptic One of the important aspects is the use of soda ash, sodium chloride and liquid glass together. However, it is not recommended to use these compounds in combination with lime, chalk, gypsum and cement. Because when mixed with these building materials, they form a weak calcium fluoride compound.

According to their chemical properties, the following compounds are close to the above-mentioned compounds, with good solubility but slightly higher toxicity: “ammonium silicon fluoride”, “PDH” (a mixture of fluorine, dinitrophenol and sodium chromate), “sodium pentochlorophenolate”, “urolite” and “spirit chloride”. There are also antiseptics of the type "" and they are recommended for use in buildings with high humidity conditions [1].

The increased percentage of free phenol in the composition of some types of antiseptics limits their widespread use in residential buildings. Therefore, the level of harmfulness of the components when using one or another type of antiseptic studied and implemented for use based on relevant conclusions [2].

A mixture of this type of paste in water is applied to the surface of wooden materials and structures using various methods, both in a simple way and under pressure. There are indications for the use of modern extractive and clay impregnations in the protection of natural wooden materials with a cracked cross-section.

Taking into account the service life of wooden materials and structures, oil antiseptics are also widely used along with pastes. These include coal and low-coking coal and shale oils. Oil antiseptics have a pungent odor and are impregnated with wood under pressure. The consumption of the compositions is determined depending on the degree of impregnation and is carried out using special equipment. In places where impregnation under pressure is not possible, on construction sites or in places where there is no appropriate equipment and tools, this work is carried out in special hot and hot-cold baths.

Today, a modern type of oily antiseptics, such as “pentachlorophenol” with a concentration of 5%, which is soluble in organic substances, is being introduced for various operational processes. At the same time, types such as “oxydiphenol” and “copper naphthinate”, which are not much different from “pentachlorophenol” in chemical composition, are being used [3].

The application of water-soluble and oily antiseptics to the cut surfaces of wooden materials and structures involves separate technological processes. Water-soluble liquid antiseptics are sprayed 1-2 times with special brushes or rollers, as well as 2-3 times with hydraulic guns. The interval between each spraying or application is 12-20 minutes, and a 1-2 mm layer is formed with each application.

In new technologies that are widely used today, a method of making small grooves on the cut surfaces of wooden materials that do not affect their strength has been introduced into practice. Although the consumption of antiseptics increases to a certain extent in this method, it has been confirmed that the degree of protection increases by 50-70%. In particular, it has been possible to increase the degree of impregnation to a high level by heating the antiseptics to 85-90 ℃, immersing the wood in it and cooling it to 20-25 ℃ [3].

In recent years, the technology of impregnation under pressure in closed containers (autoclaves) has been widely used to increase the efficiency of impregnation work. When using this method, antiseptics penetrate the wood very deeply and thoroughly. It is required that the moisture content of the materials be less than 20%. Materials with a moisture content of 40% and above are impregnated by the diffusion method. Therefore, it is recommended to use pure sodium

fluoride paste or a mixture of it with sodium silicon fluoride as an antiseptic in this method of drying.

Before installing wooden elements and construction materials, it is necessary to process them according to the specified requirements, to bring them to uniform standard sizes, to drill holes for attachment and to perform other similar works [4].

One of the most common methods of drying is in one- and two-bath tanks and in autoclaves under pressure. In this, the wooden material is heated in a bath filled with a hot soaking liquid (antiseptic) and then transferred to a cold bath. The temperature in the cold bath is 20-40 ℃ for aqueous mixtures and 40-50 ℃ for oily mixtures. The time of keeping the materials in the baths depends on the soaking method. The structural scheme of the two-bath immersion device is shown in Fig. 1.

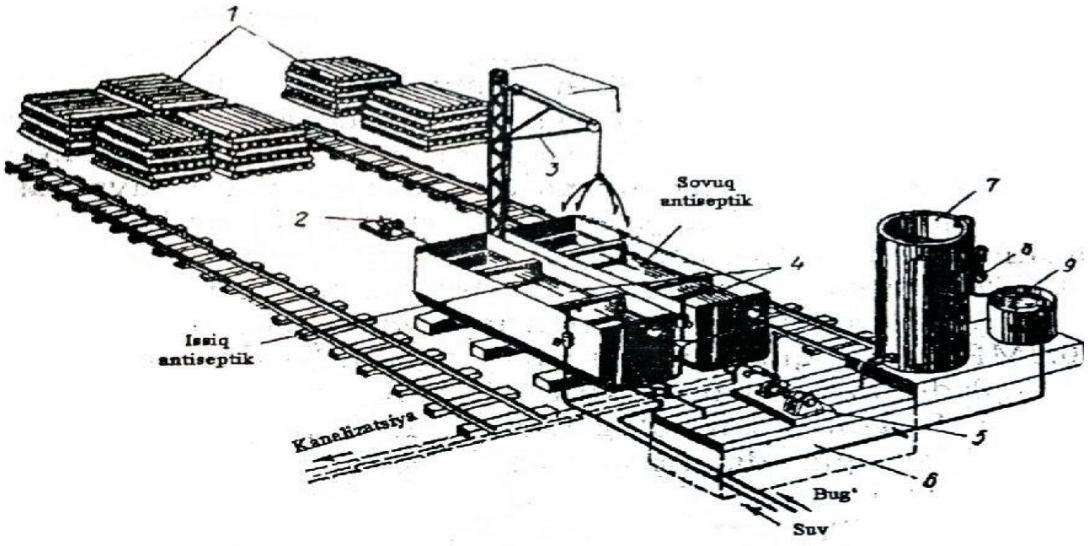

Figure 1. Structural scheme of the two-bath soaking device.

1st material warehouse; 2-equipment for loading and unloading materials; 3-lifting device; 4-bathrooms; 5-liquid extraction mechanism; 6-liquid storage place; 7-liquid cylinder; 8th pump; 9- a mechanical device designed for liquid preparation;

There are a number of modern methods of soaking in autoclaves, which are as follows.

- maximum soaking method - in this method, the wooden material placed in the autoclave is kept under vacuum for 15 minutes and a pressure of 0.9-1.3 MPA is applied for 30-90 minutes;
- full soaking method - in this method, wooden material is considered a method intended for soaking only water-soluble contents under high pressure;
- limited soaking method - this method is a low-cost method, initially a pressure of 0.2-0-3 MPa is created in the autoclave and the air in the wooden structure is squeezed out, and then the pressure is increased to 0.8 MPa and a vacuum is created;

One of the effective modern methods widely used today is the drying method. In this method, the wood material is first dried to a specified moisture level, and in this process, the liquid replaces the moisture. The oil content being filtered is heated up to 80℃ and vacuum is created [2].

Figure 2 below shows an overview of the autoclave device.

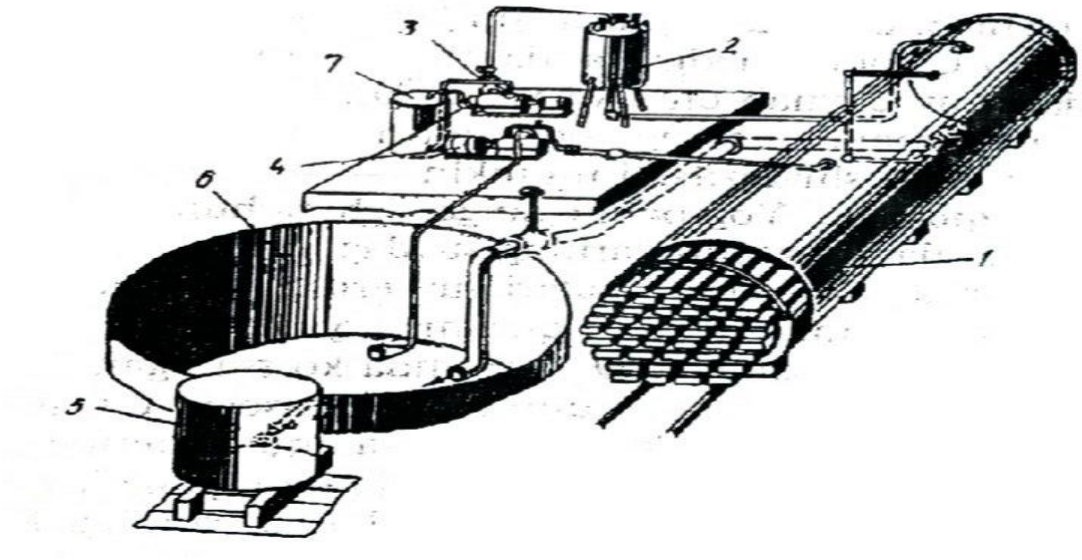

Figure 2. Structural scheme of the autoclave soaking device.

1-absorbing cylinder; 2-accumulator device; 3-vacuum pump; 4-liquid pump;

5-liquid container; 6-mixing tank; 7-liquid volume measuring device.

The advantage of autoclave impregnation is that it involves the use of new RMK-3, and in some cases VVN-12 vacuum devices with high work efficiency. Thus, based on the results of the analysis, it is necessary to apply these methods to protect wooden materials from decay and various influences, and to determine the appropriate technical and economic indicators when performing these works, taking into account the above requirements.

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