UDC 678.06-405; 666,189

RATIONAL USE OF SOFT WOOD WASTE PRODUCTION OF MATERIALS FOR CONSTRUCTION APPLICATION

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В статье представлены результаты исследований, показывающие возможность использования композиционных материалов строительного назначения на основе мягких отходов деревообработки и минерального вяжущего – модифицированного жидкого стекла, обеспечивающего влаго- огне- и биостойкость материалов. Эффективность применения жидкостекольных вяжущих в композитах с древесным заполнителем обусловлена отсутствием отрицательного влияния органических экстрактов древесины на процесс их твердения, благодаря чему обеспечивается достаточная прочность получаемых материалов.

The article presents the results of studies showing the use of composite materials for construction application based on soft wood waste and mineral binder - modified liquid glass, providing moisture fire and biological stability of such materials. The effectiveness of liquid - glass binding in composites with wood filler due to the lack of negative impact of organic extracts of wood in the process of curing, thereby providing sufficient strength of the materials produced.

Introduction

One of the main directions of development and improvement of technology of woodworking can be considered the introduction of non-waste technologies, which will enable better use of wood raw materials, fuel and energy that will make it possible to minimize waste production and to implement measures to protect the environment.

Currently soft wood waste, in particular sawdust, obtained in the processing of wood, are generally regarded as raw materials for burning any use in agriculture. However, because of the low calorific sawdust is their use is less desirable with respect to other types of fuel. Of all wood waste sawdust different mass yield, uniformity of shape and size. They are, as it were specially prepared semi-finished product for further use.

Reducing the volume of waste forest products or their exclusion due to development and introduction of low-waste and non-waste technologies, as well as the processing of residual materials in the resource industries makes better use of the biomass of a tree, and thus save a considerable amount of standing timber as a source of raw materials and of the environment [1] .

The Main part

Currently, the developed countries of Europe (and especially in the Nordic countries), most of the housing was built of wood and composite materials. The European Union in the framework of the "Wooden Europe" plans to increase the share of wooden housing up to 80% of the newly introduced 90 low-rise housing. In accordance with the concept of development of housing construction in Belarus to 2016 the share in the total volume injected low-rise housing should grow from 35 to 40%.

Fig. 1. Frame-panel house

To date, the greatest preference in the construction of low-rise housing is given in the main frame and panel construction. Panel houses are made on a frame of wooden sticks with a shell of its predominantly plate materials with the filling of the internal space between the two different fibrous, foamed materials or air exchange serving major insulator. Panel houses are not allocated architectural qualities, but it's the cheapest form of housing today.

Houses made of frame-panel technology, different kinds of wall materials. Walls, as a key element of the house, to a large extent determine the quality, look and feel. They should have the necessary strength, durability, sound insulation, meet the requirements for thermal protection and fire, provide architectural expression. Fig. 1 shows a frame-panel house.

At the Department of Technology and Design Wood BGTU designed composition for insulation material on the basis of wood particles (chips) and the mineral binder, which is a modified liquid sodium glass [2,3]. As a wood filler were used sawdust from the sawmill frame faction 5-2 and humidity 60-10%.

In the preparation of composite building materials water glass is commonly used as supplements to the basic binder. The effectiveness of liquid glass binding in composites with wood filler due to the lack of negative impact of organic extracts of wood in the process of curing, thereby providing sufficient strength derived materials [4]. In addition, the prerequisites for such composites are high adhesion of liquid glass to wood, low cost and availability of raw material, simple technology, high temperature resistant, non-toxic and non-combustible liquid glass and materials on its basis. Among the significant disadvantages of sodium silicate as a binder are its low water resistance. Even when in the moist air, the strength of a silicate binder and weakens over time, the adhesive layer is destroyed by the action of carbon dioxide and moisture in the air [4]. To increase the water resistance and adhesive properties of the liquid glass is possible by modifying the latter.

The test results of the composite mineral wood are presented in the table.

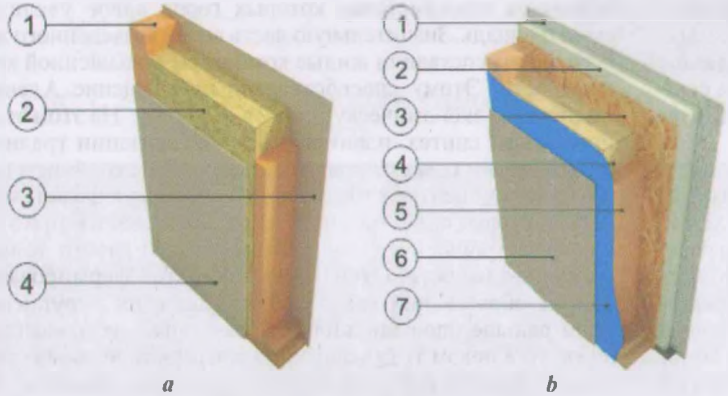
The results of tests of wood-mineral composite

Type of test	Identification of the substance			
	Composite by modifitsirovan-foot water glass fiberboard	Hardboard Thermal insulation GOST 4598	Arbolit GOST 19222	Cheapboard thermal insulation GOST 16381
Density, kg / m^3	340±30	250±30	400500	250±30
Bending strength, MPa	0,48	1,2	0,7-1,0	5
Water absorption for 2 hours, %	0,4	30	4-5	not more than 80
Biostability	biostability	not biostability	biostability	not biosta-bility
Fire resistance, weight loss, %	8,87	is not flame-retardant	flame-retardant	is not flame-retardant
Thermal conduc-tivity, W/m K	0,087	0,07	0,080-0,095	0,058

Comparison of the main indicators of the quality of the insulation material traditionally produced composites similar use of wood-based showed that the material developed for some special properties beyond them. This is especially noticeable on such an important indicator as an indicator of

water absorption of the composite has developed high levels of bio- and fire, unlike chipboard and fiberboard, which are flammable and must be protected from moisture, rodents, insects and microorganisms. Also for the material based on the modified polypropylene molten glass can be sawdust humidity (60- 70%) without preliminary drying. Thus physical-mechanical properties of the composite are not reduced.

In the study of the toxicity of the material obtained from the analysis of emission of fluoride ions it has been found that the emission of fluoride ions does not exceed the requirements of the MPC (determined 0.15-0.18 mg / m³ MAC - not more than 0.2 mg / m³ according to GOST 12.1.007) that also distinguishes them from chipboard and fiberboard. The developed material can be used in the construction of frame-panel houses as the filling of the internal space in a frame of wooden sticks with a shell (Fig. 2) instead of the traditionally used composite materials (particleboard, fiberboard building appointment or arbolita) based on the soft wood waste.



a *b*

Fig. 2. Construction panels fabricated homes:

a – the construction of exterior walls:
1 – bar frame of joined billets 150h50 mm for load-bearing walls and partitions to 100x50 mm;

2 – thermal insulation material based on glass modifitsirovannogozhidkogo;
3 and 4 – gipsostruzhechnaya plate (GPS) with a thickness of 10 mm;
b – exterior wall construction:

1 – organic facade plaster; 2 – polystyrene PSB-S-35 50 mm;
3 – heat insulating material based on modified water glass;
4 – basalt insulation density 45 kg / m³;
5 – Front frame of joined boards section 150h50 mm;
6 – gipsostruzhechnaya plate (SHG) with a thickness of 10 mm;
7 – vapor barrier membrane.

Conclusion

Designed insulation material based on modified water glass can be used in various areas of construction: during the construction of frame-panel houses for insulation intermediate floors in stone and wooden buildings, the device walls, insulation of the roof, walls, and others. Given the high biological stability of the resulting material, it can be recommended for the insulation of buildings breeding complex having, as a rule, high humidity and corrosive environments.

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Поступила в редакцию 05.11.2015.

УДК 711.555(534)

АРХИТЕКТУРНО-ПЛАНИРОВОЧНАЯ ОРГАНИЗАЦИЯ ЖИЛЫХ ОБРАЗОВАНИЙ В ГОРОДЕ АДЕН (РЕСПУБЛИКА ЙЕМЕН)

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В статье рассмотрены особенности планировки и застройки жилых образований Адена второй половины XX – начале XXI века. Предложения по совершенствованию их планировочной структуры в условиях нового строительства заключаются в уточнении типологии жилых образований, изменении их параметров, касающихся численности населения, площади, состава объектов культурно-бытового обслуживания, а также в дополнении архитектурно-планировочных принципов формирования жилой застройки.

Введение

Крупный йеменский город Аден, занимающий второе место в стране по численности населения, в 1950 году занимал второе место после Нью-Йорка как порт с самым большим грузооборотом. В последующие годы в связи с закрытием Суэцкого канала в 1967 – 1975 гг. значение порта в мировых грузоперевозках снизилось, однако Аден оставался одним из крупнейших экономических центров Аравийского полуострова. В пятидесятые годы прошлого века в городе проживало 140 тыс. человек, в настоящее время население насчитывает свыше 760 тыс. человек [1]. Значительный рост населения сопровождался масштабным жилищным строительством – в городе возводились многочисленные жилые образования, планировка и застройка которых на разных этапах развития страны существенно отличалась. Установление особенностей архитектурно-планировочной организации жилых образований является актуальной проблемой йеменского градостроительства.

Основная часть

Изучение источников [2] позволило разделить изучаемый временной период (вторая половина XX – начало XXI века) на следующие этапы формирования жилых образований:

- колониальный (1950 -1967 гг.);
- независимости (1967 – 1990 гг.);
- объединения страны (1990 – настоящее время).

В соответствии с выделенными этапами в качестве объектов исследования были выбраны возведенные по проектам жилые образования, анализ которых мог выявить характерные особенности их планировки и застройки. В процессе исследования были проанализированы проектные материалы, которые позволили разработать структуру планировочной организации жилых территорий.

Первый этап формирования жилых образований (1950 – 1967 гг.) связан с существованием британского протектората Адена. В эти годы осуществлялась пространственная сегрегация местного, преимущественно