

# Analysis of the application and development of new building materials in modern high-rise buildings

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**Abstract.** With the rapid development of modernization in China, the construction projects are gradually developing towards high-rise buildings in the actual construction to improve the social and economic benefits, reduce the investment of municipal construction and shorten the construction time. Thus with the high requirement for the construction, new building materials are used to fully meet the corresponding needs of modern high-rise buildings and other special functions. This article discusses new building materials and the application and development trend of new building materials in modern high-rise buildings which can provide some references and help for the better development of the two parts.

## 1. Introduction

The increasing population of the city makes modern high-rise buildings necessary to solve the dilemma of high intensity, super concentration, large density, high capacity and so on. High-rise buildings can economize urban land, shorten the development cycle of public facilities and municipal pipe networks, reduce municipal investment and speed up urban construction. Thus, in order to promote the development of high rise buildings more effectively, it is necessary to develop new construction materials with high strength, light quality and durability when it comes to the environment, management, safety, and construction technology of high rise buildings.<sup>[1]</sup>

## 2. Application of new building materials in high rise buildings

The new building materials play an more important role in the construction of modern high-rise buildings than the traditional building materials including new wall materials, thermal insulation materials, and decoration materials, etc.

### 2.1. Application of new wall materials

With the promotion of the green concept and the lack of land resources, it has become an inevitable trend to replace the traditional solid bricks with new wall materials in high-rise buildings. The new wall materials include substantial varieties and categories which are different from the solid bricks, lime stones and other traditional wall materials. From the functional level, there are wall materials, decorative materials, doors and windows materials, thermal insulation materials, waterproof materials, sound insulation materials, bonding and sealing materials, and all kinds of hardware, plastic parts, auxiliary materials and so on. From the material level, there are natural materials, chemical materials, metal materials, non-metallic materials, etc. The characteristics of the above are light weight, heat insulation, sound insulation, thermal insulation, formaldehyde free, no benzene, no pollution, etc. Some new composite energy saving wall materials are integrated with fireproof, waterproof, moisture-proof, sound insulation, heat insulation and heat preservation which makes it



simple and quick to assemble and have a greater use of space<sup>[2]</sup>. Many new wall materials are widely used, such as a plaster or cement lightweight partition board, color steel plate, and aerated concrete block and so on.

## 2.2. Application of thermal insulation materials

The heat preservation of high building is also a key to the construction project. Thermal insulation materials are materials complex with significant impedance for heat flow. The common characteristics of thermal insulation materials are light, loose, porous or fibrous. The insulation conduction can be barriered because of its internal air resistance. What's more, the inorganic material not only isn't flammable but the use temperature is wide. And besides, the chemical corrosion resistance is good. Today, global thermal insulation materials are developing towards the integration of high efficiency, energy saving, thin layer, heat insulation and waterproof protection. While developing new thermal insulation materials, There are also some aspects that are emphasized which include the targeted use of thermal insulation materials, design, and construction according to standard specifications. and when insulation efficiency is as far as possible to be improved costs are also reduced<sup>[3]</sup>. There are some thin layer thermal insulation coatings which are researched on at home and abroad, such as Thelma cover and other products of Ceramic-Cover & J.H. International by SPM Thermos-Shield, Thermal Protective Systems in the United States and zs-211 reflective thermal insulation coatings, folding ZS-1 high temperature insulation coating material, heat insulation felt soft sonar in China.

## 2.3. Application of new decorating materials

The new decoration material is a kind of green, environmental protection, energy saving, heat preservation and fireproof performance superior material. The surface of the material is smooth, and the density is high. It truly realizes the production line of the new building wallboard, and greatly reduces the labor intensity of the production workers with the characteristics of wide source of raw materials, simple production process and low energy consumption in production. For example, a new type of glass material that combines special materials and glass organically can not only realize the effective control of convective heat transfer but also automatic dimming with the change of contact temperature, intelligently control indoor temperature to create a more comfortable environment for people through the use of special technology.<sup>[4]</sup>

Gra.1. Classification table of new building materials

Category	Features and Benefits	Related Materials
New Wall Materials	light weight, heat insulation, sound insulation, thermal insulation, formaldehyde free, no benzene, no pollution	plaster or cement lightweight partition board, color steel plate, aerated concrete block
Thermal Insulation Materials	light, loose, porous, fibrous, internal air resistance, good chemical corrosion resistance	Thelma cover products, zs-211 reflective thermal insulation coatings, folding ZS-1 high temperature insulation coating material, heat insulation felt soft sonar
Decoration Materials	green, environmental friendly, energy saving, smooth surface, high density	Liquid wallpaper, anhydrous gypsum plaster, the soft stone floor

## 3. The future development trend of new building materials in high-rise buildings

There are many advantages of the new building materials, such as multi-function, reliable, safe and beautiful, making it better adapt to the development of modernization. Therefore, the development of new building materials and effective application to modern high-rise buildings can improve people's life and promote the development of science, technology and economy. New building materials can

improve the safety of modern high-rise buildings and the sustainable development of environmental resources. At the same time, the application of new materials can improve the seismic system of modern high-rise buildings effectively, and the use of fire-resistant or flame-retardant new materials can also reduce casualties and economic losses caused by fires<sup>[5]</sup>. Using new materials with light quality, sturdy structure and durability in actual construction will not only reduce the weight of the building and the consumption of the material effectively, but also promote the development of mechanized construction, improve the efficiency of construction, reduce the cost of construction, and promote the ecological construction of high-rise buildings.

#### **4. The necessity of the application of new building materials in high rise buildings**

With the city land conflicts have become increasingly prominent, high-rise building gradually appeared, and the size and the number gradually increased, however, the high-rise building from the longitudinal perspective, the transportation capacity is low and is very limited, coupled with the external open space is very small. If an earthquake or a fire is a disaster, it will cause a strong evacuation and the pressure of fire and rescue. Therefore, in order to promote the modern high-rise building fire seismic function, a series of new materials used is very necessary in the actual process of construction, the application of new materials to modern high-rise buildings aseismic system effectively improved, and the use of new materials or refractory flame retardant can also reduce the fire caused casualties and economic loss<sup>[6]</sup>.

At the same time, in the construction process of traditional construction, the vast majority are usually used to clay solid bricks, but because the clay solid brick itself has high energy consumption and heavy pollution in the production of the phenomenon, affecting the sustainable development of the economy, coupled with the high-rise building itself larger, higher consumption of building materials once the weight, the use of clay solid brick buildings will increase, increasing environmental pollution, and the use of new materials, strong and durable quality in the actual construction, not only can effectively reduce the weight of the building and material consumption, but also can promote the development of mechanized construction, improve construction efficiency, reduce the construction cost. To promote the ecological construction of high-rise buildings.

#### **5. Concluding remarks**

The development of world economy and progress, demand for energy is increasing, but in the process of energy utilization has also appeared a lot of waste, especially in recent years, the energy has become less and less, so the energy problem has attracted more and more attention of all countries in the world<sup>[7]</sup>. Compared with traditional building materials, new materials have many advantages, such as light weight, high strength, heat preservation and energy saving, etc.<sup>[8]</sup> In the construction of modernization, the construction of high rise buildings is the power source for the development and use of new building materials, meanwhile the development and research of new building materials also provides basic guarantee for the development of modern high-rise buildings.

#### **References**

- [1] Application of [J]. Ka Fai new building materials in the modern high-rise buildings in Jiangxi building materials, 2017 (21): 300.
- [2] Li Kecheng, Wu Chaoyang. Research on the application of new building materials in modern high-rise building [J]. China Building Materials Technology, 2015, 24(02): 72-73.
- [3] Zhu Yuanli. Application of new building materials in modern high-rise building [J]. Sichuan building materials, 2017, 43 (02): 246-248.
- [4] Ge Yan. Analysis of the application of new building materials in modern high-rise buildings [J]. low carbon world, 2016 (27): 197-198.
- [5] Li Kecheng, Wu Chaoyang. Research on the application of new building materials in modern high-rise building [J]. China Building Materials Technology, 2015, 24(02): 72-73.

- [6] Li Kecheng, Wu Chaoyang. Research on the application of new building materials in modern high-rise building [J]. China Building Materials Technology, 2015, 24(02):72-73.
- [7] Miao Xianhua of new building materials. The development trend of [J]. green building materials, 2018 (01): 10+13.
- [8] Fang Guofang. A brief analysis of the characteristics and development trend of new building materials [J]. Henan building materials, 2016 (04): 259-260.