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Electrical technology used in low-energy buildings

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Abstract. Energy shortage is a development problem facing the world at present. China's energy efficiency is about 30%, only about 1/2 of that of developed countries. Taking China's construction industry as an example, the energy consumption per unit of building area is equivalent to 2 to 3 times that of developed countries. High-energy buildings still occupy the main position. If the energy-saving technology promotion is not considered in the construction process, the energy crisis will be directly aggravated. The construction industry is vigorously introducing advanced electrical technologies to achieve the development goals of saving energy and reducing consumption.

1. Introduction

Our country is both a big energy country and a huge energy consumer. Compared with other countries, the per capital resource rate in our country is relatively low. Saving energy is an important matter at the moment and needs to be highly valued. At the same time, energy-saving technologies continue to improve. It can alleviate contradictions and support the development of the national economy. Therefore, in order to reduce the consumption of energy, the construction of electrical equipment should follow the principle of applicability in accordance with the principle of practical benefit and the principle of conservation of energy, so as to maximize energy conservation and make the construction industry develop rapidly and healthily.

As the ecological environment deteriorates, people are wasting resources and energy, and energy is beginning to be in short supply, prompting people to increase their environmental awareness. The construction industry consumes a lot of energy and needs to accelerate its transition to ecological direction. In view of this, many large construction companies have begun to pay attention to building energy conservation, and have mentioned a new strategic height for the energy-saving design of electrical automation systems in construction engineering. The traditional manual management mode has been gradually replaced, improving the operational efficiency and quality of equipment. In the construction project, advanced energy-saving technologies and materials are used to design green and energy-saving buildings, so as to improve the economic efficiency of construction enterprises while improving energy conservation and environmental protection of construction projects.

2. Significance of electrical technology in energy-efficient buildings

Since the reform and opening up, China's economy has developed rapidly, but at the same time, energy consumption has also increased dramatically, and the task of energy conservation and emission reduction is arduous. In the construction sector, energy-efficient housing and smart homes are rapidly developing. At this time, faced with the threat of traditional resource shortage, economic and social benefits must be two-pronged. The application of electrical technology in energy-efficient buildings



occupies a large proportion. Long-term high-load power consumption will lead to various unexpected events such as fires, reduce the load on the power network, and develop energy-saving buildings. The new electrical technology application not only promotes the rational integration of resources, reduces the energy consumption in the previous buildings and the energy loss in the transmission lines, transformers and networks in the power transmission, fully exerts the effectiveness of the energy-saving building equipment, and ensures the stable and reliable operation of the power supply system. With the large-scale development of energy-efficient buildings, the innovative application of electrical technology continues to be favored by people. At the same time, long-term high-power power also has many potential dangers. For example, long-term power consumption will cause the wires to heat up and redden, which may easily cause fires, threaten people's lives and property, and is widely used in modern buildings. Electrical technology has greatly improved the risk index of buildings. In order to reduce the risk, it is necessary to design and install energy-saving equipment according to your own needs when building the grid. This skill not only makes better use of electricity, but also removes a time bomb placed in the building. However, when applying existing technologies, we should make full use of new technologies, gradually improve the defects in the process of building electrical technology, and let energy-efficient buildings start from the bottom and better promote electrical technology.

3. Electrical technology implementation principles

3.1. Feasibility principle

In the electrical design process, the basic electrical requirements within the building are to be met, and the necessary energy supply is normally provided for the environment. On this basis, the energy-saving design of the electric energy is carried out, and the construction of the power supply system and the reliability of the electric power system are analyzed. The building mode has different lighting, color temperature and color rendering index in different places and different needs. At the same time, the improvement of different functions of household appliances is especially necessary. Therefore, the electrical design should not damage the basic functions of the building. Under the principle of viability, reasonable planning of electrical technology energy conservation.

3.2. Maintain Principles

The input of any project should be organically combined with cost and economic benefits. The design of electrical energy-saving devices in buildings should be consistent with social development, avoiding the risk of excessively pursuing high efficiency and energy saving and making the project cost budget beyond the capacity. Therefore, in the electrical design process, the designer should consider the multi-angle and all-round comprehensive considerations, ensure the construction quality and construction efficiency of the electrical engineering, and reduce the maintenance cost of the future equipment without exceeding the budget of the project.

4. Specific application directions of electrical technology in energy-saving buildings

4.1. Energy-saving design of power distribution system

First, the substation is the core power supply part of the building. The substation and power distribution equipment should be planned at the load center to reduce the line loss during the power supply process and reduce the power supply range of the low voltage cable. For air-conditioning, electric heating and other seasonally varying loads, separate transformers should be provided to reduce unnecessary losses of the transformer. When selecting a transformer, the maximum load calculation is performed to reasonably determine the transformer capacity and the number of units. Secondly, reactive power compensation is performed on the low voltage side of the transformer to improve the power factor of the power supply and distribution system. Finally, reduce the number of power distribution stages in the distribution system. Generally, the number of low-voltage total distribution boxes to the number of electrical equipment should not exceed three.

4.2. Electrical energy-saving design of construction equipment

Large-scale or extremely important buildings can be monitored by an automatic monitoring and alarm system for air conditioning, drainage systems, and electric motors. The equipment is adopted, and the green equipment such as environmental protection and energy-saving motor, frequency conversion speed control fan and water pump are used reasonably. The frequency conversion fan adjusts the air supply volume of the air conditioner in real time through the frequency conversion method, matches the indoor load change, and greatly saves the energy consumption of the fan.

4.3. Lighting system energy-saving design

First, use a high-efficiency light source. Although the incandescent lamp has the advantages of low price, mild radiance, easy disassemble and maintenance, etc., its illuminating brightness is low, high energy consumption, and the filament is easily burned out. Therefore, in the electrical design process of buildings, the use of incandescent lamps is reduced or eliminated, and the use of thin-diameter fluorescent lamps, compact fluorescent lamps and high-efficiency high-pressure sodium lamps is widely promoted in lighting systems. Second, the use of energy-efficient lamps. In the process of designing architectural lighting systems, LED lighting energy-saving lamps with high efficiency, high brightness, low energy consumption and low heat release are often used under the conditions of glare and light distribution. Third, rationally plan the layout of the building and try to use natural lighting. If the building is close to the outdoor part, the doors and windows should be opened or set as floor-to-ceiling windows to make full use of the natural light source. For large-depth rooms, classrooms, shopping malls, and other large space places where the lighting effect is not good, the lighting design can be paralleled with the outer window, and the natural light on the window side can be fully utilized at multiple angles to achieve the purpose of lighting energy saving.

In building electrical equipment, the energy consumption of air conditioning systems and lighting systems is high, with air conditioning systems having the most energy consumption and lighting systems being the second largest energy consumption system in buildings. Real-time control and intelligent control are the two main forms of energy-saving control for lighting system. Intelligent control is the control method that designers often use when designing energy-saving buildings. The three components of an intelligent control system are the system unit, the output unit, and the input unit. These three units are organically connected in series through a computer network. Using intelligent control systems Instead of traditional panel switches, smart relays and panels integrated into the intelligent system make it easy to control multi-line integrated power switches. The public communication trunks transmit information in the intelligent control system to make the entire lighting system of the building more uniform.

4.4. Lighting system energy-saving design

In addition to the design of lighting, temperature control, ventilation, drainage, etc., the construction also involves the energy consumption of automatic doors and windows, computers, kitchen appliances, drinking water, elevators, etc., not only to adopt new energy-saving materials, The development of technology and the Internet should make great use of advanced technology and introduce intelligent power control systems. Using sensing systems such as humidity, infrared, temperature, sound and light, the intelligent control system senses "off" when no one is using electricity. If someone enters, the system can start the system according to the actual situation to meet people's electricity demand.

At the same time, with the development of Internet + technology, electrical smart homes have also been widely researched, and smart home dedicated client software is built through sensing devices and Bluetooth or long-distance wireless transmission modules. Users can check the switch status of each household appliance through intelligent software anytime and anywhere, and turn off the power consumption equipment in time. The client platform and the household intelligent power control system cooperate with each other, saving manpower and material resources, reducing building energy consumption and improving energy efficiency. Far-reaching significance.

5. Conclusion

Electrical technology has a broad application space in energy-efficient buildings. Energy conservation and emission reduction is an important task in China's new century. With the continuous innovation and application of electrical technology, it is believed that under the guidance and encouragement of the country's correct policies, the research on energy-efficient buildings will be achieved. Make greater progress. To sum up, in order to build an energy-efficient building, we must start from the basics, first of all, pay attention to energy saving in electrical technology. With the steady development of science and technology in our country and the continuous emergence of new technologies, the application of new technologies will definitely drive the energy saving of electrical technology.

The application of electrical automation technology in energy-efficient design of buildings can greatly reduce the energy consumption of construction equipment and improve the safety and stability of the electrical system operation of buildings. Reducing the energy consumption of building electrical equipment can reduce the cost of building construction. At the same time, it can rely on energy-saving technology to improve people's experience of buildings, continuously improve people's satisfaction with modern buildings, and promote the sustainable and healthy development of the construction industry.

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