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INFLUENCING FACTORS AND ENERGY-SAVING TECHNOLOGY OF HEATING BOILER

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Abstract

The article analyzes the factors that determine the energy efficiency of heating boilers, and considers the technologies of energy saving and environmental protection when using heating boilers, which contribute to greening and sustainable development of the heating industry.

Keywords: heating boilers, exhaust gases, ecological technology, energy saving, environmental protection.

Анотація

У статті проаналізовано фактори, що визначають енергоефективність опалювальних котлів, розглянуто технології енергозбереження та захисту навколишнього середовища при використанні опалювальних котлів, які сприяють екологізації та сталому розвитку теплоенергетики.

Ключові слова: опалювальні котли, відпрацьовані гази, екотехнології, енергозбереження, захист довкілля.

Introduction

The rapid development of the market economy has promoted the acceleration of the urbanization process, and residents have increasingly high requirements for the quality of life. Heating, as a basic content in modern urban construction, plays an important role in promoting the development of urban economy. However, because the heating industry needs to consume a lot of resources and energy, and the utilization rate of energy is not high, so it has caused a very serious waste of energy and resources at the same time, but also led to the urban environment has been greatly affected, so it is necessary to improve the environmental protection technology of heating boilers through effective energy saving and environmental protection measures to achieve the comprehensive growth of economic and social benefits.

Research results

1 Factors affecting energy saving and environmental protection of heating boilers

1.1 Exhaust volume and temperature of boiler

In order to make the heating boiler energy-saving and environmental protection, we must find the factors that affect the energy-saving and environmental protection effect of the heating boiler, and start from these factors to improve the heating boiler, in order to make the heating boiler energy-saving and environmental protection. Among the factors affecting the energy saving and environmental protection of heating boilers, the first is the exhaust volume and temperature of heating boilers [1]. The smoke temperature emitted by the heating boiler is very high, which can also be regarded as containing very large heat. Therefore, if the heating boiler has been discharging a large amount of smoke, a considerable part of its own heat will be lost, which greatly reduces the temperature of the heating boiler, and a large number of raw materials have to be consumed to raise the temperature back, which greatly increases the loss of the heating boiler [2].

1.2 Carbon content in furnace slag of heating boiler

Effective treatment of carbon content in slag can reduce the energy consumption of heating boilers. In actual work, the carbon content control method of boiler slag can generally be considered from three aspects: first, the control of coal water. The moisture content of coal has a direct impact on the operating efficiency of heating boilers. If the intensity of coal burning is too large, the higher the moisture content, the easier it is to cause the coal can not be fully burned, resulting in the waste of energy. Second, reasonable adjustment of boiler operating parameters. If the parameter setting of the boiler operation is not reasonable, it will lead to a lot of not fully burned will be discharged from the furnace, affecting the operating efficiency of the heating boiler. Third, the temperature in the furnace is controlled. If the temperature in the furnace is too low, it will

increase the burden of boiler operation and cannot achieve the purpose of energy saving. The carbon content of slag is an important index affecting the energy-saving effect of boiler operation, so it is necessary to reduce the carbon content of boiler slag by appropriately increasing the temperature in the furnace, so that the boiler can operate in an energy-saving state [3].

1.3 Influence of thermal efficiency of heating boiler

Thermal efficiency is an important index of energy saving efficiency of reaction boiler. If the thermal efficiency of boiler operation can be significantly improved, better energy saving effect can be achieved. The boiler is an important energy conversion equipment in the heating system, and the thermal efficiency can reflect the efficiency of the boiler operation, which has an important impact on the energy saving of the boiler. At present, the thermal efficiency of many heating boilers is not high, which is closely related to the design of boiler furnace and the level of operator. In addition, the heating boiler needs timely maintenance after running for a period of time. If the maintenance work is not timely or not in place, the thermal efficiency of the boiler will be reduced [4]. Therefore, it is necessary to effectively control the running state of the boiler by enhancing the scientific design of the boiler furnace, improving the level of the boiler operator and other ways, and regularly overhaul and maintenance of the boiler, in order to effectively improve the thermal efficiency of the boiler, thereby improving the energy-saving effect of the boiler.

2 Research on energy saving and environmental protection technology of heating boiler

2.1 Vigorously apply frequency conversion speed regulation technology

Frequency conversion speed regulation technology is an important energy-saving and environmental protection technology applied in the operation of heating boilers, which is to change the speed of the motor by changing the power supply frequency of the motor. The application of frequency conversion speed regulation technology in the operation of the heating boiler can change the speed of the induced draft fan and other equipment in time, and finally control the air volume and flow rate in time, so that the heating boiler can have sufficient air volume in the operation process, so that the coal in the heating boiler furnace can be fully burned, so as to improve the utilization rate of energy in the heating boiler.

2.2 A stratified coal feeding device is set up in the heating boiler

The design and utilization of stratified coal feeding device can significantly improve the environmental benefit of heating boilers. The use of stratified coal feeding device can control the amount of coal and improve the particle size uniformity of coal. Through the stratification device, the coal seam can be reasonably distributed according to the standards of large, medium and small according to the different particle sizes of coal, and then the coal with different particle sizes can be selected according to the needs of coal burning, which is conducive to improving the combustion efficiency of coal burning and reducing the carbon content of furnace ash, so as to improve the efficiency of boiler operation. Through the application of stratified coal feeding device, the current boiler combustion rate can be increased by 8%-15%, the boiler carbon content can be reduced to 8%-15%, and the furnace temperature can be increased by 100-150 ℃, which greatly reduces the amount of coal used for heating [5].

2.3 Strengthen the monitoring and management of heating boilers

Strengthening the monitoring and management of heating boilers can timely and effectively deal with the problems that occur during the operation of boilers. Distributed boiler rooms should be equipped with instruments for inspection, and centralized boiler rooms should be equipped with microcomputer for monitoring. Investigate the indoor and outdoor temperatures, determine the heat supply and coal consumption of the boiler, so as to improve the efficiency of the boiler operation.

Conclusion

In summary, this paper mainly discusses the related issues of energy saving and environmental protection of heating boilers. In the operation process of heating boilers, more energy and resources will be consumed, which has a certain impact on the environment. Therefore, it is necessary to analyze the factors affecting the energy saving of heating boilers from an objective perspective, and adopt effective energy saving and environmental protection technologies to improve the operation mode of heating boilers, reduce the energy consumption of heating boilers, and promote the healthy and sustainable development of heating industry.

REFERENCES

1. Yang Xuepeng. Influence factors and technology of energy saving and Environmental protection of heating boilers [J]. Modern Industrial Economy and Information Technology, 2017,7 (18) : 35-36.

2. Zeng Yan. Energy saving control strategy of small gas boiler house [J]. Chemical Engineering Management, 2021(16):43-44.

3. Fang Ping. Analysis on energy saving and environmental protection technology of heating boiler in new era [J]. Comprehensive Utilization of Resources in China, 2017,35 (8) : 72-74.

4. Han Yangyi. Consideration on energy saving and emission reduction measures of heating boiler room [J]. Real Estate World, 2020(22):115-116.

5. Ramon. Effective measures for energy saving and consumption reduction of boiler house heating system [J]. Smart Cities, 6(11):134-135.

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