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TECHNOLOGICAL PROCESSES OF ELECTRICITY GENERATION AT STATIONS

Abstract. Types of fuel for thermal power plants are considered. In the scheme of the technological process of the heating station, it is written that it provides for five cycles. They are fuel, air, water, steam and electricity. The first three belong to raw materials, and from it comes the final product – electricity. Now consider these cycles separately and note the main mechanisms of their own needs, which perform each complex. Steam enters the condenser, which is located through the turbine stages, on top of the turbine, inside the foundation. It is described here that a steam condenser, by cooling with circulating water, condenses and turns into condensate, that is, into chemically pure water used to supply boilers. The water cycle is characterized by four divisions, uses. When burning all types of fuel in boilers, the amount of air injected is calculated by chemical reactions, which ensures that the fuel in the burners burns out completely. To prevent the fuel from burning chemically, the amount of air injected into the burner is taken 1–5 % more than the specified amount of air. The technological scheme for obtaining and burning coal dust is shown.In this article, we briefly focused on the recent functioning of modern technological Le Els of power plants and considered the saving of fuel for our country.

Keywords: Boiler Shop, fuel, air, water, steam, electricity.

Introduction

In modern energy, thermal power plants play an important role. Coal and a fuel oil of various brands are used as fuel for thermal power plants. Coal–fired stations have a much greater specific weight since low–value varieties of brown

coal are burned there, which are often not used in the metallurgical and chemical industries. There are features of the use of firewood: pre–grinding coal and turning it into dust, which ensures complete combustion of firewood. The main production shops of thermal power plants include fuel supply, pollen preparation devices, Boiler Shop, Machine Room, and Power Distribution devices. Each workshop houses the corresponding units and mechanisms equipped with an electric drive. Most of the electric motors that drive various production mechanisms of the main workshops belong to farms that cover their own needs, in addition, these farms include lighting, as well as other additional workshops and devices, such as compressor units, batteries, oil farms, etc.

Materialsand methods

In the scheme of the technological process of the heating station, five cycles can be noted: fuel, air, water, steam, and electricity.

The first three belong to raw materials, and from them comes the final product – electricity.

Now, considering these cycles separately, we note the main mechanisms of their own needs, which perform each complex.

The fuel tank is equipped with Bridge shuttles that run the width of the warehouse. Sometimes, instead of them, fixing winches (pulleys) are used, which dig up coal to the place of storage, temporarily put it and load it into a belt conveyor (conveyor) that sends coal. The crusher cuts the coal and grinds it to a certain size [1].

After timekeeping, coal enters the untreated (wet) coal bunker through inclined closed fuel supply overpasses.

Fuel delivery is carried out through two «threads» of the conveyer for mutual fund–raising.

From untreated coal bunkers, fuel enters the mills, turning into dust. Pollen enters and settles in special devices–cyclones–through the Mill fan, leaves the Cyclones, and enters the pollen bunkers located between the coal bunkers. Usually, at this stage, coal dust is dried with steam.

So, pollen from the pollen Hopper enters the boiler through screw transporters–izhek and sends through the pollen feeders to the burners. The air required for the pollen feeder is taken from the air system of the mill fans.

Slag and ash are discharged into the ash Hopper located under the boiler, removed from it by an ejector pump, and carried to the ash dump using a washer pump in pipes and open channels [2].

Air. For the fuel to burn out completely, oxygen is required, which is supplied in the form of additional air with the help of blower fans. Before entering the burner, the air is heated. For this purpose, heat from exhaust flue gases is used. At first, these gases with a temperature of 600 degrees pass through the water economizer,

and from there they enter the air heater at a sufficiently high temperature of 350 – 400 degrees. The air heater is divided into several channels parallel to each other, in which gas with air moves against each other to improve heat transfer. After the air heater, gas at a temperature of 120 –150 degrees passes through the ash trap and moves towards the chimney, where the smoke comes out. The gas moves from the exhaust chimney under the action of a natural force, where the desired height of the exhaust chimney must be present and the traction force is additionally provided by smoke hoods, that is, fans that create the necessary thinning.

Steam. In modern power plants, two types of steam boiler drums and direct flow are used. In boilers of the first type, the process of evaporation of water takes place in pipes located vertically to the boiler burner.

At the bottom of the pipe, the pipes are connected in two collectors, and at the top, they enter the drum located horizontally [3].

The water level in the drum comes approximately to the middle of the drum, the higher part of the drum is used as a steam collector. After that, the steam passes through the heater, dries up and enters the turbine. The Steam capacity of drum boilers is about 400 T / H.

Direct–flow boilers do not have Steam collectors, and during the operation of the boiler, steam passes through the steam boiler, which is built in a spiral (spiral), and moves to the turbine. If water does not come to such a boiler, the lower layers of pipes located in the high–temperature burner zone will burn out. Therefore, it is necessary to provide a large amount of electricity that goes to aggregate installations (supply pumps) that fulfill their own needs, as well as using steam turbine drive supply pumps [4].

Direct–flow boilers are built in the context of using unlimited steam productivity from 600 to 3000 t/h. As a rule, each of them, connected directly to the turbine and in conjunction with the generator, forms a single whole.

Results and discussion

Steam enters the condenser, which is located through the turbine stages, on top of the turbine, inside the foundation.

Here, the Steam condenser is condensed and converted into condensate by cooling with circulating water, that is, into chemically pure water used to supply boilers.

The very name «condensing» came to power plants from the fact that used water is cooled in a condenser, not counting the amount of steam released from the turbine, which is used to heat it.

In a modern boiler, high pressure of up to 100–170 horses is used, and steam heating up to 530–600C is used, which increases the efficiency of installations.

The vapor liquefaction in the condenser is 0.03–0.04 horses. to, through the ejector is carried out.

Still–used Steam has a high heat content, and since combustion losses are always high with cooled circulating water, the efficiency of such stations does not exceed 40–42%. This, of course, indicates that more than 1/3 of the fuel heat output capacity is not spent. But condensing stations can be built at a capacity of 2400MW or higher, which dramatically reduces capital costs and ensures a lower cost of electricity.

The water cycle was divided into four :

1 Steam cooling circulating water in the condenser is removed from the reservoir by coastal pumps and poured into the condensers. From the condenser, the bypass flows back to the reservoir on its own.

Depending on the capacity of the station, the cooling surface of the reservoir should be of the appropriate volume. Condensate is drawn out of the condenser by condensate pumps, passes through Low–Pressure Heaters, and enters the deaerator.

2 additional water from the reservoir, passing through a chemical water purifier, enters the condensate deaerator, which replenishes the losses lost as a result of evaporation. The name «deaerator» indicates that the water used is separated from the air oxygen dissolved in it. We heat the water and release oxygen, otherwise, the water oxygen will cause the pot metal to corrode.

3 from condensate and additional water, we get the necessary used water for the boiler. It is poured into the boiler through supply pumps. At first, the water passes through high–pressure heaters and enters the economizer, where it warms up to a temperature of about the temperature of the water in the boiler, after which the water used is poured into the boiler.

Repeated heating of water used based on steam, which is separated from different stages of turbines, is called regenerative, which provides a smooth increase in the thermal power unit.

4 electricity. In one unit with the turbine, a synchronous generator is located. The stations under consideration are usually built in places of fuel production, away from consumers who use electricity directly. The generators of the stations are power transformers with a block attached to the pulleys, which produce electric energy, transmitted through high voltage Composite busbars of 35–110 KW and the power transmission of the power system. In places where the power of the station is consumed by tens, hundreds, and thousands of KM, directly depending on the voltage, there will be substations with step–down transformers. In addition, thermal power centers form a connection with other stations or power systems for mutual power exchange [4].

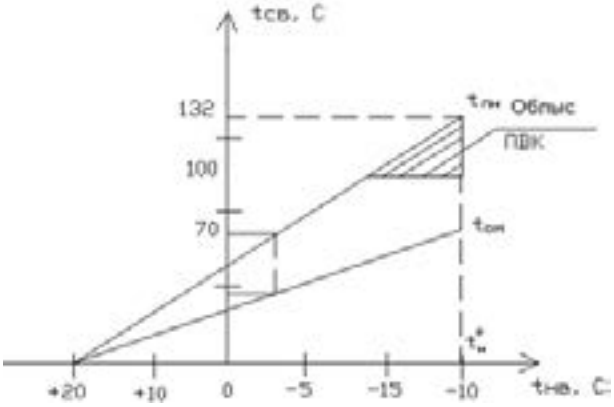

Figure 1 – temperature graph of Heat Supply

After separating light fractions from wet oil: gasoline, kerosene, solarium oil, and other so–called motor fuels, that is, lower–level fractions used for the work of Automobile, tractor, and diesel engines, the fuel oil is sheltered from wet oil. There are different grades of fuel oil «10' and «40», which are distinguished from each other depending on the moisture and ash content. Fuel oil has a very high heat dissipation capacity: 1kg – up to 9420–9850 kcal.

The fuel oil is pumped into the burner through a nozzle, converted into pollen with the help of hot air, and burned. The flash point of fuel oil is much lower than that of coal pollen, so fuel oil nozzles are easier to burn. Pollen is burned using fuel oil from a coal burner. During the winter, there are some difficulties with the extraction of fuel oil from railway tanks, which are in such a state as oil (Smola) that you have to heat it with steam.

As an energy gas fuel in gas fuel electric stations, a mixture of propane and butane gases is most often used – natural gas. The composition of natural gas: methane CH–60–80 %, hydrogen–10–30 %, other hydrocarbons 4–16 %.

The combustion year of the gas is between 7000–5000 kcal / m3 relative to the pressure of the atmosphere [5].

Thanks to the use of gas, you can easily master the capacity of power plants, ensuring cleanliness. Air is injected into the gas laces to burn the required amount of gas along with the gas. To increase the efficiency of the Boilers, the air supplied to the laces is heated. When burning all types of fuel in boilers, the amount of air injected is calculated by chemical reactions, which ensures that the fuel in the burners burns out completely. To prevent the fuel from burning chemically, the amount of air injected into the burner is taken 1–5 % more than the specified

amount of air. The technological scheme for obtaining and burning coal dust is shown in Figure 1.2. [6].

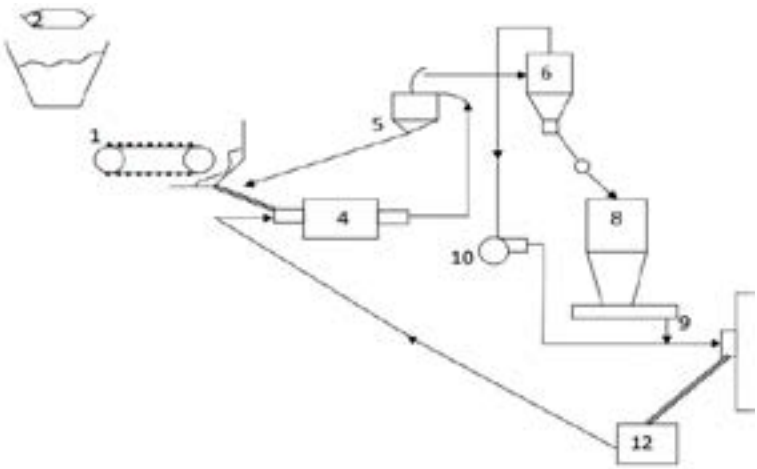

Figure 2–technological scheme for obtaining and burning coal dust

1–wet, unproduced coal hopper; 2–belt conveyor for transporting coal from the warehouse; 3–coal mill with a deposit absorber; 4–conventional drum mill 18–25 rpm, ball–30 mm; 5–pollen separator. Due to the swirl of air in the separator, the large piece of iron loses its strength and is directed back to the mill. Thinned pollen enters cyclone 6 along the pipes, cyclone 6 serves to deprive pollen of air. 90 % of the pollen is collected and deposited in the cone–shaped part, and from the pollinated air Fan 10 is sucked in and enters the lace (gorelka), 7 the device that delivers the pollen to the intermediate Hopper; 8 – the intermediate Hopper of the finished pollen; 9–the glass absorber that delivers the pollen from the hopper to the 8–injectors; 10–the fan that sucks the pollinated air from the cyclone 6 and sends it from the absorber to the 9–October injectors; 11 – dust coal nozzle, which is mixed with hot air through and the hot mixture is sent to the boiler burner; there are several such nozzles in Kazan: up to 4–15 pieces: a hot air collector up to 12–400 degrees. Hot air is supplied to mill–4, draining the coal, and the dust is sent to separator–5 and cyclone–6. Hot air from the Collector enters the nozzle – 11 and, together with air from the fan – 10, is used to burn dust into the boiler fuel [1].

Conclusion

In power plants, on average, the specific gravity of fuel costs is 75 % of all costs, so fuel savings and its 1kW .reducing the share of spending on H–brings more benefits to the economy of the country [2].

In this article, we briefly focused on the recent functioning of modern technological Le Els of power plants and considered the saving of fuel for our country.

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СТАНЦИЯЛАРДА ЭЛЕКТРЭНЕРГИЯСЫН ӨНДІРУДІҢ ТЕХНОЛОГИЯЛЫҚ ПРОЦЕСТЕРІ

Жылу электрстанцияларының отын түрлерін қарастырылған. Жылу станциясының технологиялық процесінің схемасында бес циклды қарастырғаны жазылған. Олар отын, ауа, су, бу және электр энергиясы. Алғашқы үшеуі шикізатқа жатады, ал одан ақырғы өнім – электр энергия шығады. Енді осы циклдарды жеке – жеке

қарастырып, әр комлексті атқаратын өзіндік ұқтаждардың негізгі механизмдерін атап өтілген. Бу турбина сатылары арқылы, турбина үсті, фундамент ішінде орналасқан конденсаторға келіп түседі. Мұнда бу конденсаторы циркуляциялық сумен салқындату арқылы қоюланып, конденсатқа айналады, яғни қазандарды жабдықтауға қолданылатын химиялық таза суға айналатыны сипатталған. Су айналымы төрт бөліндісі, қолданысы сипатталған. Қазандарда отынның барлық түрлерін жағу кезінде енгізілетін ауа мөлшері химиялық реакциялар бойынша есептелінеді, бұл оттықтардағы отынның толығымен жанып кетуін қамтамасыз етеді. Отынның химиялық түргыдан жанбай қалуын болдырмау үшін, оттыққа енгізілетін ауа мөлшері, белгіленген ауа мөлшерінен 1–5 % артығырақ алынады. Көмір тозаңын алу және жағу технологиялық схемасы көрестілген. Берілген мақалада электр станциялардың қазіргі таңдағы технологиялық сүлбелерінің жалпы соңғы уақыттағы жұмыс істеуіне қысқаша тоқталып, отынның елімізге үнемделуі қарастырылды.

Кілтті сөздер: казан цехы, отын, ауа, су, бу, электр энергия.

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ТЕХНОЛОГИЧЕСКИЕ ПРОЦЕССЫ ПРОИЗВОДСТВА ЭЛЕКТРОЭНЕРГИИ НА СТАНЦИЯХ

Рассмотрены виды топлива тепловых электростанций. В схеме технологического процесса теплостанции написано, что предусмотрено пять циклов. Это топливо, воздух, вода, пар и электричество. Первые три относятся к сырью, а из него выходит конечный продукт – электричество. Теперь рассмотрим эти циклы по отдельности и выделим основные механизмы собственных нужд, выполняющие каждый комлекс. Пар поступает через ступени турбины в конденсатор, расположенный внутри над турбиной, фундамента. Здесь описывается, что паровой конденсатор сгущается и конденсируется путем охлаждения циркуляционной

водой, то есть превращается в химически чистую воду, используемую для оснащения котлов. Описаны четыре раздела круговорота воды, Применение. Количество воздуха, вводимого при сжигании всех видов топлива в котлах, рассчитывается по химическим реакциям, что обеспечивает полное сгорание топлива в топках. Во избежание химического воспламенения топлива количество воздуха, вводимого в топку, берется на 1–5% больше установленного количества воздуха. Разработана технологическая схема получения и сжигания угольной пыльцы. В данной статье кратко остановились на работе современных технологических процессов электростанций в целом за последнее время, а также была рассмотрена экономия топлива в стране.

Ключевые слова: Котельный цех, топливо, воздух, вода, пар, электричество.

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