PREVENTION OF CONDENSATION FORMATION IN GAS-EXHAUST DUCTS OF BOILER PLANTS IN THE APPLICATION OF COMPLEX HEAT-RECOVERY SYSTEMS

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Purpose - increase of durability and reliability of gas-exhaust ducts of heating boiler plants by application of heat-recovery technologies with combined use of recovered heat.

Results of work

In traditional heat-recovery systems of boiler plants designed to heat only one heat-transfer agent (return water or combustion air), the heat potential of the waste heat of the boiler exhaust-gases is underused. At the using complex heat-recovery systems with heating of both heat-transfer agents, fuel efficiency in the boiler plant is significantly increased due to deeper cooling of exhaust-gases compared to traditional systems. Deeper cooling of gases requires the use of measures to protect the exhaust-gas ducts from condensation.

In the work, computational studies concerning the application of the heat method of exhaust-gases predrying in a heat exchanger gas-preheater in complex heat-recovery systems have been carried out. In order to prevent condensation in the gas-exhaust ducts of boiler plants with brick and metal thermally insulated chimneys, the necessary levels of preheating Δt of exhaust-gases in this gas-preheater were determined.

To assess the effectiveness of the predrying method, the coefficient γ, was calculated as the ratio of the heating capacity Q_c, necessary for the implementation of this method, to the heating capacity of the heat-recovery equipment Q_{hr} was used.

Research results indicate that in complex heat-recovery systems, the required Δt levels are Δt = 12 ° C and 9 ° C for brick and metal chimneys, respectively. These levels are 1–2 ° C lower compared to traditional systems, despite lower exit temperatures of exhaust-gases, at is explained by a greater decrease in the dew point of these gases during their deeper cooling. Comparison of the values of the heat consumption coefficient γ indicates a more significant difference. So for a complex heat-recovery system, the γ value is 20–30 % less due to an increase of heating capacity Q_{hr} of heat-recovery equipment compared to traditional heat-recovery plants.

Conclusion

Application in complex heat-recovery systems of boiler plants of the heat method of exhaust-gases predrying provides anti-corrosion protection of their exhaust-gas ducts.