

DESIGN AND EXPERIMENTAL INVESTIGATION OF A TOP-FED PELLET BURNER

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Abstract

Because of high efficiency and automatic control, pellet stoves are suitable for homes with a large living room or connected living room, dining room, and kitchen. This paper presents the construction of a fixed bed pellet burner fed from above, a system for cleaning of a glass door, experimental investigations of CO emissions, and suggests and analyzes a system for automatic control of the burning process in the examined pellet stove. The suggested cleaning mechanism of the glass at the front door, which uses Coanda effect, performed satisfactorily during testing. In two 6-hours-tests, the amount of oxygen in the dry flue gas varied from 10.90 to 11.72 vol% with the average CO emissions between 27 and 35 ppm. The average CO emissions at 13 vol% O₂ in the dry flue gas at normal conditions were 36.3 mg/m³_N and 34.9 mg/m³_N at maximal and reduced heat output, respectively. The presented results were achieved with ENplus-A1 class wood pellets. The burner, however, showed functioning problems due to ash slagging when domestic pellets produced from bark and thinnings were used as a fuel. Due to this problem, a system for automatic control of the burning process is suggested and analyzed.

Keywords: pellet burner, pellet stove, CO emissions, burning control

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