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Cyclonic Rice Husk Furnace and Its Application on Paddy Drying

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Abstract

The objectives of this research are to design, construct and test a rice husk furnace for a commercial fluidized bed paddy dryer with capacity of 10,000 kg/h. The furnace was cylindrical in shape with inner diameter of 1.37m and height of 2.75m. Rice husk was fed into the furnace with a feed rate of 110 kg/h to 136 kg/h. Air and rice husk entered to the combustion chamber in tangential direction with vortex rotation. The experimental results showed that for heights of ash on grate of 300 mm, 450 mm, 500mm and 600mm, rice husk feed rates were 110 kg/h to 136 kg/h and excess air 265% to 350% with combustion gas temperature approximately 523 °C to 710 °C. Thermal efficiency of the furnace system increasing with excess air was approximately 57% to 73% while carbon conversion efficiency was approximately 89% to 97%. The height of ash on grate had no effect on the system performance. Financial analysis indicated that the pay-back period of the furnace was 1200 hours, when used in place of the diesel oil burner. Latest information shows that the rice husk furnace has been commercialized for more than 40 units since the beginning of the year 1999.

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