

## Optimizing Fire Tube Boiler Design for Efficient Saturated Steam Production at 2000kg/h

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**Abstract :** This study focused on designing a Fire tube boiler to generate saturated steam with a 2000kg/h capacity at a 12bar design pressure. The primary project goal is to achieve efficient steam production while minimizing costs. This involves selecting suitable materials for component parts, employing cost-effective construction methods, and optimizing various parameters. The analysis phase employs iterative processes and relevant formulas to determine key design parameters. This includes optimizing the diameter of tubes for overall heat transfer coefficient, considering a two-pass configuration due to tube and shell size, and using heavy oil fuel no.6 with specific heating values. The designed boiler consumes 140.37kg/hr of fuel, producing 1610kw of heat at an efficiency of 85.25%. The fluid flow is configured as cross flow, leveraging its inherent advantages. The tube arrangement involves welding the tubes inside the shell, which is connected to the tube sheet using a combination of gaskets and welding. The design of the shell adheres to the European Standard code for pressure vessels, accounting for weight and supplementary accessories and providing detailed drawings for components like lifting lugs, openings, ends, manholes, and supports.

**Keywords :** efficiency, coefficient, saturated steam, fire tube

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