

RINGKASAN

Analisa ini berjudul "Analisis Kualitas Air Umpan Boiler dan Dampaknya terhadap Efisiensi Operasional Pabrik Kelapa Sawit". Tujuan dari penelitian ini adalah untuk menganalisis kesesuaian parameter kualitas air umpan boiler terhadap standar *American Society of Mechanical Engineers* (ASME) dan menilai dampaknya terhadap efisiensi operasional pabrik kelapa sawit. Parameter utama yang diuji meliputi pH, *Total Dissolved Solids* (TDS), silika, total *hardness*, dan M-alkalinity, yang semuanya berperan penting dalam menjaga kinerja dan keandalan sistem boiler. Hasil analisis menunjukkan bahwa seluruh parameter air umpan berada dalam batas standar yang ditetapkan ASME. Nilai pH berada pada kisaran 8,5 – 9,2, yang ideal untuk mencegah korosi pada sistem pipa dan boiler. Nilai TDS tercatat kurang dari 700 ppm, menandakan rendahnya kandungan zat terlarut yang dapat menyebabkan pembentukan endapan. Kandungan silika di bawah 20 ppm menunjukkan bahwa potensi pembentukan kerak keras pada permukaan dalam boiler sangat minim. Hardness total berada di bawah 0,3 ppm, yang berarti risiko pembentukan skala sangat rendah. Sementara itu, M-alkalinity berada pada rentang 20 – 50 ppm, cukup untuk menjaga kestabilan pH air dan menghindari kondisi asam atau terlalu basa dalam sistem. Dengan terpenuhinya standar kualitas air umpan boiler, efisiensi operasional pabrik dapat dipertahankan secara optimal. Boiler dapat beroperasi tanpa gangguan akibat korosi, pembentukan kerak, atau masalah termal lainnya yang biasa timbul akibat kualitas air yang buruk. Selain itu, penggunaan bahan kimia tambahan untuk pengolahan air dapat diminimalkan, sehingga mengurangi biaya operasional. Pemeliharaan unit boiler juga menjadi lebih mudah dan jarang, memperpanjang umur peralatan serta meningkatkan keberlangsungan proses produksi. Berdasarkan temuan ini, dapat disimpulkan bahwa pengendalian kualitas air umpan boiler yang sesuai standar ASME berperan penting dalam mendukung efisiensi dan keandalan operasi pabrik kelapa sawit secara keseluruhan.

SUMMARY

This analysis is entitled "Boiler Feed Water Quality Analysis and Its Impact on Palm Oil Mill Operational Efficiency". The purpose of this study was to analyze the suitability of boiler feed water quality parameters to the American Society of Mechanical Engineers (ASME) standards and assess their impact on palm oil mill operational efficiency. The main parameters tested included pH, Total Dissolved Solids (TDS), silica, total hardness, and M-alkalinity, all of which play an important role in maintaining the performance and reliability of the boiler system. The results of the analysis showed that all feed water parameters were within the standard limits set by ASME. The pH value was in the range of 8.5 - 9.2, which is ideal for preventing corrosion in the pipe and boiler systems. The TDS value was recorded at less than 500 ppm, indicating a low content of dissolved substances that can cause deposit formation. The silica content below 20 ppm indicates that the potential for hard crust formation on the inner surface of the boiler is very minimal. The total hardness was below 0.3 ppm, meaning the risk of scale formation is very low. Meanwhile, M-alkalinity is in the range of 20 – 50 ppm, sufficient to maintain the stability of the water pH and avoid acidic or overly alkaline conditions in the system. By meeting the boiler feed water quality standards, the operational efficiency of the plant can be maintained optimally. The boiler can operate without interruption due to corrosion, scale formation, or other thermal problems that usually arise due to poor water quality. In addition, the use of additional chemicals for water treatment can be minimized, thereby reducing operational costs. Boiler unit maintenance also becomes easier and less frequent, extending the life of the equipment and increasing the sustainability of the production process. Based on these findings, it can be concluded that boiler feed water quality control according to ASME standards plays an important role in supporting the efficiency and reliability of palm oil mill operations as a whole.

