

ABSTRAK

Cycle gas cooler E 4602 pada pabrik petrokimia memiliki peranan penting dalam menjaga temperatur reaktor saat reaksi polimerisasi. Fluida *cycle gas* dari reaktor ini diketahui membawa *finest* masuk ke *cooler tube*. Dengan belum diketahuinya analisis kinerja aktual dari *cycle gas cooler* E 4602 berhubung dengan adanya *finest* yang masuk ke dalam *cooler (tube)* yang mana akan membuat *fouling* pada *cooler* kemudian maka pada penelitian ini dilakukan analisis kinerja *cycle gas cooler* E 4602 . Penelitian kinerja *cycle gas cooler* dilakukan secara analitik dengan menggunakan metode perhitungan *logarithmic mean temperature difference* (LMTD) dan *the number of transfer units* (NTU). Dari hasil analisis didapatkan terjadi penurunan laju perpindahan panas secara keseluruhan dari 14742298.57 J/s menjadi 11944827.04 J/s. Penurunan Laju perpindahan panas (q) ini ikut berpengaruh terhadap penurunan nilai dari koefisien perpindahan panas keseluruhan (U) dari 1094.35 W/m².K menjadi 949.83 W/m².K pada akhir periode. Penurunan koefisien perpindahan panas keseluruhan (U) menunjukkan bahwa telah terjadi peningkatan *fouling* dari 0.0009094 m².K/W menjadi 0.001047 m².K/W pada akhir periode analisis. *Effectiveness* pada *cooler* ini juga terjadi penurunan dari 51.93% menjadi 48.09% pada akhir periode analisis. Adapun periode optimal untuk dilakukan proses *cleaning* direncanakan pada bulan kelima puluh 2 pada bulan April 2026 dengan nilai R_f sudah mencapai 0.0024768 m².K/W.

Kata Kunci: *cycle gas, cooler, fouling*, LMTD, NTU



PERFORMANCE ANALYSIS OF CYCLE GAS COOLER E 4602 SHELL AND TUBE TYPE AT A PETROCHEMICAL PLANT IN BANTEN

ABSTRACT

Cycle gas cooler E 4602 in a petrochemical plant has an important role in maintaining the temperature of the reactor during the polymerization reaction. Fluid cycle gas from this reactor is known to carry fines into the cooler tube. The actual performance analysis of the cycle gas cooler E 4602 is unknown due to the presence of fines that enter the cooler (tube) which will cause fouling in the cooler later. Therefore, in this study, the performance analysis of cycle gas cooler E 4602 was carried out. Research on cycle gas cooler performance was carried out analytically using the logarithmic mean temperature difference (LMTD) and the number of transfer units (NTU) calculation methods. From the analysis results, it was found that there was a decrease in the overall heat transfer rate from 14742298.57 J/s to 11944827.04 J/s. This decrease in the heat transfer rate (q) also affected the decrease in the value of the overall heat transfer coefficient (U) from 1094.35 W/m².K to 949.83 W/m².K at the end of the period. The decrease in the overall heat transfer coefficient (U) indicates that there has been an increase in fouling from 0.0009094 m².K/W to 0.001047 m².K/W at the end of the analysis period. The effectiveness of this cooler also decreased from 51.93% to 48.09% at the end of the analysis period. The optimal period for the cleaning process is planned for the fifty-second month in April 2026 with an R_f value of 0.0024768 m².K/W.

Keywords: cycle gas, cooler, fouling, LMTD, NTU

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