

INTISARI

Alat penukar kalor pada Industri dirancang berbasis standar TEMA. Salah satu parameter yang sangat berpengaruh pada unjuk kerja alat penukar kalor adalah *fouling factor*. Pengotoran ini terjadi di sisi dalam dan luar *tube*. Hal ini menarik untuk diamati pada perancangan alat penukar kalor.

Penelitian ini melakukan perancangan alat penukar kalor berbasis TEMA. Perhitungan *thermal* menggunakan metode *Bell Delaware*. Variasi *fouling factor* dilakukan pada desain menggunakan 3 *baffle*. Unjuk kerja *thermal* alat penukar kalor diamati pada variasi *fouling factor* yaitu tanpa *fouling*, *fouling factor*-nya rendah, dan *fouling factor*-nya tinggi. Unjuk kerja *thermal* berfokus pada koefisien perpindahan kalor keseluruhan, laju perpindahan kalor, efektivitas, dan luasan *heat transfer*.

Hasil perancangan alat penukar kalor berhasil dilakukan dengan berbasis standar TEMA. Dimensi utama dari alat penukar kalor yaitu diameter luar 267 mm dan panjang *tangent line to tangent line* 3235 mm menggunakan 36 *tubes* dengan pengaturan *in-line* 90°. Hasil pengamatan pada variasi *fouling factor* menggunakan metode Bell Delaware memperlihatkan bahwa kenaikan nilai *fouling factor* menurunkan nilai koefisien perpindahan kalor pada kisaran 13-14 W/m^2C , laju perpindahan kalor sebesar 5.000-6.000 J/s, efektivitas sebesar 3 – 3,5%, dan meningkatnya luasan *heat transfer* yang dibutuhkan seluas 0,45-0,5 m^2 .

Kata kunci : Penukar Kalor *Shell and Tube*, TEMA, *Fouling Factor*

ABSTRACT

Heat exchangers in the Industry are designed based on TEMA standards. One of the most influential parameters for the performance of a heat exchanger is fouling factor. Fouling occurs on the inside and outside of the tube. This is interesting to observe in designing a heat exchanger.

Heat exchanger equipment in the industry designed based on TEMA standards. One of the performance parameters seen in fouling factors. This fouling occurs on the inside and outside of the tube. This is interesting for designing heat exchangers.

Heat exchanger is designed based on TEMA standard for this research. Methods for determining thermal calculation is designed using Bell Delaware methods. Fouling factor variation is carried out on 3. The thermal performance of heat exchanger is investigated on clean condition, low fouling factor, and high fouling factor. Thermal performance are focused on overall heat transfer coefficient, heat transfer rate, effectiveness, and heat transfer area.

Results show that the heat exchanger are successfully designed based on TEMA. The main dimension of heat exchanger are 266 mm diameter and 3235 mm of tangent line to tangent line length with 36 tubes in-line 90° layout. In the investigation of fouling factor using Bell Delaware methods, it is shown that addition of decrease the value of heat transfer coefficient in range of 13-14 W/m^2C , heat transfer rate in range of 5.000-6.000 J/s, effectiveness up to 3 - 3,5%, and increase heat transfer area in range of 0,45-0,5 m^2 .

Keywords : Shell and Tube Exchanger, TEMA, Fouling Factor