

# ANALISIS PENGARUH VARIASI BAHAN INSULASI SALURAN *CHILLED WATER* TERHADAP PERFORMANSI *PROTOTYPE MINI WATER CHILLER*

Oleh:

**I Gusti Made Buddhi Satya Utama, NIM 1715071004**  
Program Studi Pendidikan Teknik Mesin

## ABSTRAK

Laju perpindahan panas yang tinggi dari lingkungan menuju saluran *chilled water* akan berpengaruh kepada performansi *prototype mini water chiller*, sehingga perlu dilakukan penginsulasian saluran *chilled water* menggunakan insulator yang tepat untuk mengoptimalkan performansi *prototype mini water chiller*. Penelitian ini bertujuan untuk mengetahui pengaruh variasi bahan insulasi saluran *chilled water nitrile rubber expanded* dan *polyurethane foam* terhadap performansi *prototype mini water chiller*, yang mencakup capaian suhu optimal dan laju pendinginan ruangan *prototype mini water chiller*.

Metode yang digunakan dalam penelitian ini adalah metode eksperimen dengan variabel bebas yakni variasi insulator saluran *chilled water*, serta variabel terikat yakni capaian suhu optimal dan laju pendinginan ruangan *prototype mini water chiller*. Proses pengujian dilakukan sebanyak 20 kali pengulangan pengambilan data pada setiap variasi insulator dengan total jumlah pengambilan data sebanyak 60 kali dengan menggunakan *stopwatch*, *thermo gun*, *thermostat*, tang ampere, bohlam, dan elemen pemanas air sebagai alat dalam penelitian, dan *nitrile rubber expanded* serta *polyurethane foam spray* sebagai bahan penelitian.

Hasil yang didapat dari penelitian menunjukkan rata-rata capaian suhu optimal *prototype mini water chiller* pada variasi insulator *polyurethane foam* sebesar 11,242°C, dan pada variasi insulator *nitrile rubber expanded* sebesar 11,250°C serta rata-rata laju pendinginan ruangan *prototype mini water chiller* pada variasi *polyurethane foam* sebesar 0,001415°C, sedangkan pada variasi *nitrile rubber expanded* sebesar 0,001029°C, yang menunjukkan bahwa terdapat pengaruh variasi bahan insulasi saluran *chilled water* terhadap performansi *prototype mini water chiller*.

Kata kunci: insulasi, performansi, *prototype mini water chiller*.

**ANALYSIS OF THE EFFECT OF CHILLED WATER PIPE  
INSULATION VARIATIONS ON THE PERFORMANCE OF MINI  
WATER CHILLER PROTOTYPE**

*by:*

**I Gusti Made Buddhi Satya Utama, NIM 1715071004**  
*Mechanical Engineering Education Study Program*

**ABSTRACT**

*High heat transfer rate from the environment to the chilled water pipe will affect the performance of the mini water chiller prototype, so it is necessary to insulate the chilled water pipe using the right insulator to optimize the performance of the mini water chiller prototype. This study aims to determine the effect of the chilled water pipe insulator variations which are nitrile rubber expanded and polyurethane foam on the optimal temperature and cooling rate of the mini water chiller prototype cabin.*

*The method used in this study is an experimental method with, variation of the insulator as independent variables, and the optimal temperature also cooling rate of the mini water chiller prototype cabin as the dependent variables. The testing process was carried out 20 times repetition of data collection on each variation using a stopwatch, thermo gun, thermostat, ampere pliers, a bulb, and a water heating element as a tool in research, and expanded nitrile rubber and polyurethane foam spray as research material.*

*The results obtained from this study showed that the average optimal temperature achievement of the mini water chiller prototype with polyurethane foam insulator was 11.242°C, and with the nitrile rubber expanded insulator was 11.250°C. Otherwise, the average cooling rate of the mini water chiller prototype cabin with polyurethane foam insulator variation was 0.001415°C, while in the variation of nitrile rubber expanded it was 0.001029°C, which indicates that there is an effect of chilled water pipe insulator variations on the performance of the mini water chiller prototype.*

*Keywords: insulation, performance, prototype mini water chiller.*