

**A STUDY OF MECHANISM FOR THE PREVENTION OF COLD INFLOW
INTO CHIMNEYS USING WIRE MESH**

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i. Sinopsis

Aliran udara sejuk menunjukkan kesan yang signifikan terhadap alam draf penukar panas berpendingin hawa (NDACHE). Untuk mengkaji mekanisme bagi pencegahan aliran udara sejuk ke dalam cerobong NDACHE, sejumlah tujuh konfigurasi eksperimen telah dilaksanakan dalam model prototaip beban haba yang berbeza di antara 0.75kW dan 1,25kW. Kesan skrin kawat mesh pada prestasi cerobong telah ditentukan. Suhu dan halaju yang diukur untuk konfigurasi dan beban haba. Ini mendapati bahawa hanya pemasangan atas dan tengah dan tengah mampu mengekalkan halaju draf walaupun dengan rintangan mesh. Ini juga mendapati bahawa konfigurasi menggunakan mesh di bawah telah mengalami penurunan halaju draf sebanyak 50% daripada kawalan. Ujian visualisasi aliran asap jelas membuktikan kemasukan fenomena aliran udara sejuk boleh diatasi dengan pemasangan kawat mesh di atas model. Dalam fasa kedua projek, 3 bukaan yang berbeza bagi kawat mesh dan dua ketinggian cerobong telah diuji. Pembukaan besar membenarkan lebih banyak aliran udara sejuk dan draf adalah berkadar langsung dengan ketinggian cerobong. CFD juga dilakukan bagi prototaip untuk menjelaskan punca kawat mesh berperanan sebagai penghalau aliran udara sejuk.

Synopsis

Cold air inflow has significant effect on a natural draft air cooled heat exchanger (NDACHE) chimney. To study the mechanism for the prevention of cold inflow into NDACHE chimney's, in total seven configuration of experiments were carried out in the prototype models for different heat loads at approximately 0.75kW to 1.25kW. The effect of wire mesh screen on the chimney performance had also determined. Temperature and air velocity were measured for the configurations and heat loads. It was found that the top only, Top and Middle and Middle only installations were able to maintain draft velocity to within 3.0% of the control experiment draft velocity in spite of the resistance of the mesh. It was also found that configurations utilizing mesh at the bottom had experienced a drop in draft velocity by up to 50% from the control. The smoke flow visualization tests clearly proved that cold air inflow phenomenon exists and can be countered with the installation of wire mesh at the top of the model. In the second phase of the project, the wire mesh of 3 different apertures and two chimney height were tested. Large aperture tended to allow more cold inflow and draft was directly proportional to chimney height. CFD runs were also done for the prototypes to explain the cause of wire mesh serving as repellent of cold inflow.