

ANALYSIS, DESIGN AND TESTING OF AN EARTH CONTACT COOLING TUBE FOR FRESH AIR CONDITIONING

**Joerg Henkel
Bing Chen
Mingsheng Liu
Gang Wang
University of Nebraska - Lincoln
1110 South 67th Street
Omaha, NE 68182**

ABSTRACT

Based on a theoretical analysis of small-scale experiments, a 57 m earth contact cooling tube was designed, constructed, and tested to provide cooling for residential buildings and related applications. Warm outside air is drawn through the tube and its heat is absorbed through the tube walls into the surrounding soil. The cooled air then enters the building. Our study investigated cooling performances at different air velocities and soil saturation in test run durations up to 30 days. Experiment results demonstrated that this system could provide up to 1.5 tons of cooling at a flow rate of 1600 cubic meter/hour during hot summer days. This study concluded that earth-cooling tubes are a feasible air-conditioning option for cooling demands in the Midwest, U.S.A. This system requires very little energy. Thus its use is especially interesting in areas where energy generation or supply is problematic. This paper presents the earth contact tube system, structure details of the system, and experiments.