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TECHNICAL REPORT

Determination and Comparison of Heating Capacity and Savings of Underfloor Heating Systems

This report has been prepared upon the request of Enover Enerji Inc. It covers comparison in terms of capacity and savings and aims to determine the heating capacities of the EHP underfloor heating system developed and manufactured by the company and the MARKET underfloor heating system in use in the market, according to the calculation method under the heading "Panel Heating and Cooling" presented in Chapter 6 of the "2008 ASHRAE handbook—HVAC Systems and Equipment (SI)".

The report consists of six chapters (A-F). Part A covers the introduction of test room where the experiments are carried out and test samples, Part B test procedure and measurement methods, Part C heating capacity, total heat transfer coefficient, total thermal resistance, carbon dioxide emission caused by production of underfloor heating system, energy consumption due to operation of the pump used in the circulation of water passing through underfloor heating system, the amount of fuel spent for indoor air heating, and the calculation of energy use due to fuel consumption, Part D data obtained from test measurements and parameters calculated using this data, active working times of underfloor heating system, embedded energy, exergy and CO_2 values of underfloor heating system, Part E the embedded and operational fuel, energy and CO_2 emission savings to be achieved when using an EHP underfloor heating system in a house with piping systems and calculation of installation cost for panel heating system, Part F evaluation of test results. The advantages of using the EHP underfloor heating system with steel piping system over existing MARKET underfloor heating system with PE-RT piping system and the savings achieved are summarized in Table-A.

Table A-1. The superiorities of EHP underfloor heating system over existing MARKET-like ones.

	Heat Transfer Coefficient, h	Heating Capacity	Water content in piping system	Installation cost
Superiority	+2 %	+21 %	-94 %	-67%
Value	9,82 W/m^2 °C	968 W	0,31 kg	3317 TL

Table A-2. The savings of EHP underfloor heating system over existing MARKET-like ones

	Operational Savings				
	Fuel Consumption	Fuel Energy	Pumping Energy	CO_2 emission due to fuel consumption	CO_2 emission due to pumping
Saving	+23 %	+23 %	+84%	+23 %	+84%
Value	180 l/day	1.93 kWh/day	10 Wh/day	46 g-CO_2/day	0,24 g-CO_2/day