



June 9th, 2020

TECHNICAL REPORT

Determination and Comparison of Heating Capacity and Savings of Aluminum Radiators

This report was prepared based on the request of the firm, ENOVER Energy and Thermal Systems, Co. and covers determination of heating capacity based on the standard TS EN 442-2 of ALUVER 600*1000 (13 section) Aluminum Radiator with Heat Pipe developed and constructed by ENOVER and comparison with the one existing in the market, MARKET 600*1000 (13 section) Aluminum Radiator in the view of capacity and savings.

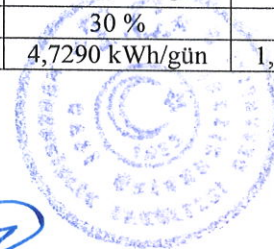
The report consists of six chapters (A-F). Part A covers the introduction of test room where the experiments are carried out and test samples, Part B test procedure and measurement methods, Part C heating capacity, total heat transfer coefficient, total thermal resistance, carbon dioxide emission caused by radiator production, energy consumption due to operation of the pump used in the circulation of water passing through the radiator, 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 radiators, embodied energy, exergy and CO₂ values of radiators, Part E the embodied and operational fuel, energy and CO₂ emission savings to be achieved when using a ALUVER radiator in a house with seven radiators, Part F evaluation of test results. The advantages of using the ALUVER radiator over existing radiators and the savings achieved are summarized in Table-A.

Table A-1. The superiorities of ALUVER radiator over existing radiators

	Radiator Weight	Heating Capacity	Heat dissipated per unit weight	Heat dissipated per unit weight per unit heat transfer area	Heat Transfer Coefficient
Superiority	0 %	+10 %	+19 %	+19 %	+61 %
Value	9,62 kg	1733 W	180 W/kg	53 W/m ² kg	16,03 W/m ² °C

Table A-2. The savings of ALUVER radiator over existing radiators

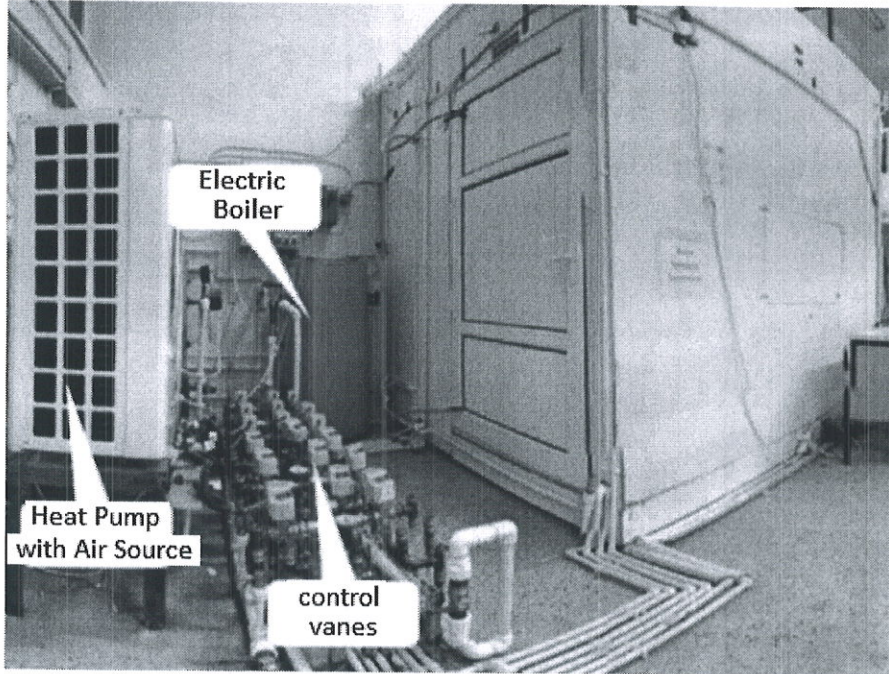
	Embodied Savings		Operational Savings		
	Energy	CO ₂	Fuel Consumption	Energy Usage	CO ₂ emission
Saving	0 %	0 %	30 %	30 %	30 %
Value	0 kWh	0 kg	445 L/gün	4,7290 kWh/gün	1,362 kg-CO ₂ /gün





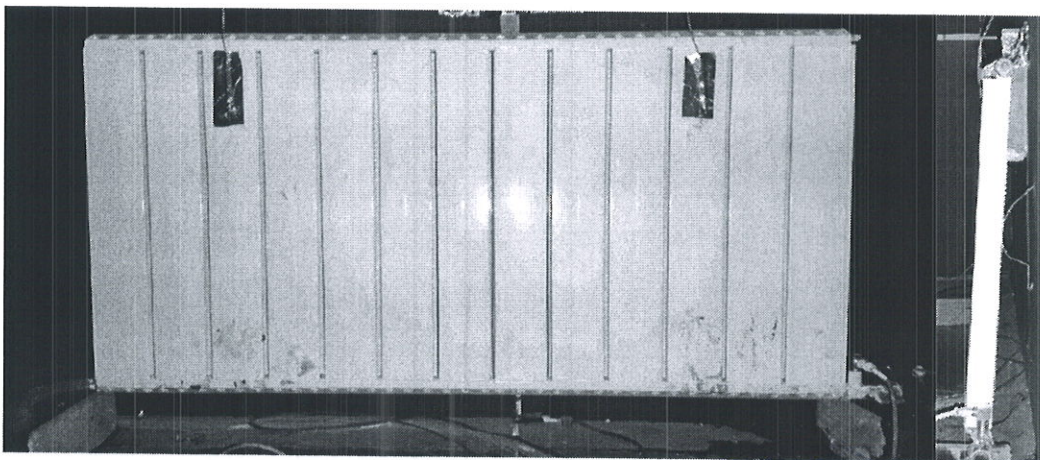
A. Introduction to Test Chamber and Test Specimens

Capacity determination tests were performed based on TS EN 442-2 Standard in the test chamber set up at the Thermal Science Laboratory of Mechanical Engineering Department of Gazi University in Ankara, Turkey. Test chamber was constructed according to ANSI/ASHRAE 138 Standard and was able to control the temperatures of air and its wall surfaces as shown in Picture 1.



Picture 1. View of Test chamber and its mechanical equipment

Test specimens: ALUVER “ Aluminum Radiator with Heat Pipe” and MARKET Aluminum Radiator. The same chassis was used in the experiments



Picture 2. Aluminum 600*1000 (13 section) Radiator – Location of thermocouples

