

Accepted Manuscript

Research Paper

Energy and exergy analyses of natural gas-fired boilers in a district heating system

Meryem Terhan, Kemal Comakli

PII: S1359-4311(17)30927-4

DOI: <http://dx.doi.org/10.1016/j.applthermaleng.2017.04.091>

Reference: ATE 10240

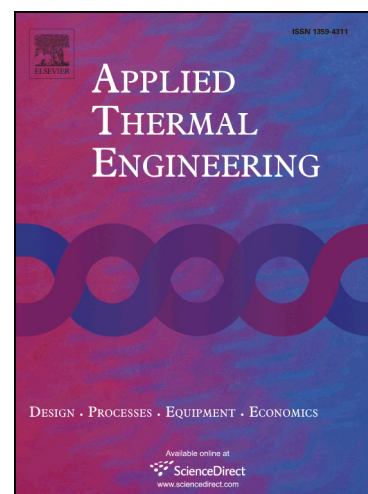
To appear in: *Applied Thermal Engineering*

Received Date: 11 February 2017

Accepted Date: 20 April 2017

Please cite this article as: M. Terhan, K. Comakli, Energy and exergy analyses of natural gas-fired boilers in a district heating system, *Applied Thermal Engineering* (2017), doi: <http://dx.doi.org/10.1016/j.applthermaleng.2017.04.091>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Energy and exergy analyses of natural gas-fired boilers in a district heating system

Meryem Terhan^{a,*}, Kemal Comakli

^a Department of Mechanical Engineering, Engineering and Architecture Faculty, Kafkas University, 36100, Kars, Turkey

Abstract

In this study, energy and exergy analyses of natural gas fired boilers in a district heating system are performed. Mass, energy and exergy balance equations are formed for the boilers and its components. In the boilers, energy or heat losses are examined, and the biggest of these is identified as the heat loss of flue gases. Energy and exergy efficiencies of the heating system are researched, and the energy, exergy flow diagrams are illustrated by specifying locations of irreversibilities. According to the results of the analyses, the ratio of flue gas energy and exergy losses in the boilers are 16.81% and 6.14%, respectively. The energy and exergy efficiencies of the boilers are found to be 82% and 32.78%. The location, where the maximum of the irreversibility in the boilers is noticed as combustion chamber, and adiabatic combustion temperature is calculated as 1846 °C.

Keywords: energy analysis, exergy analysis, district heating system, boilers, exergy efficiency, irreversibility

1. Introduction

Energy consumption is the most important indicator that demonstrates country's development degree. As a result of population growth, urbanization, industrialization and technological developments, the energy consumption has been quickly increased. The fast upward trend is emerged vital environmental problems such as pollution and greenhouse effect. At the moment,

*Corresponding author. Tel: +904742251150

Email addresses: meryembalcin83@hotmail.com (M.Terhan), kcomakli@hotmail.com (K.Comakli)

Download English Version:

<https://daneshyari.com/en/article/4991091>

Download Persian Version:

<https://daneshyari.com/article/4991091>

[Daneshyari.com](https://daneshyari.com)