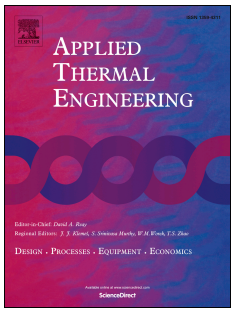
Accepted Manuscript



Fire Tube Heat Generators: Experimental Analysis And Modeling

Alberto Bisetto , Davide Del Col , Marco Schievano

PII: S1359-4311(14)01115-6

DOI: 10.1016/j.applthermaleng.2014.10.095

Reference: ATE 6191

To appear in: *Applied Thermal Engineering*

Received Date: 24 January 2014

Revised Date: 11 September 2014

Accepted Date: 27 October 2014

Please cite this article as: A. Bisetto, D. Del Col, M. Schievano, Fire Tube Heat Generators: Experimental Analysis And Modeling, *Applied Thermal Engineering* (2015), doi: 10.1016/ j.applthermaleng.2014.10.095.

Submitted to Applied Thermal Engineering

FIRE TUBE HEAT GENERATORS: EXPERIMENTAL ANALYSIS AND MODELING

Alberto Bisetto[a], Davide Del Col[a], Marco Schievano[b]

[a]Dipartimento di Ingegneria Industriale, Università degli Studi di Padova, Via Venezia 1, 35131 Padova, Italy

[b]Riello SpA, - Via Mussa 20, 35017 Piombino Dese (PD), Italy

Corresponding author: Davide Del Col; e-mail: davide.delcol@unipd.it; tel.: +39-049-8276891, fax: +39-049-8276896

ABSTRACT

This paper presents an experimental analysis and a modeling study of a three-pass fire tube heat generator, fed with natural gas. Very limited research is published in the literature on such systems. In the present paper a heat generator was tested while operating both in stationary and in dynamic regime. Tests were performed varying fuel flow rate, air index, water inlet temperature and flow rate, with and without turbulators inside the tubes of the last pass.

The experimental data were used to validate a dynamic model of fire tube heat generators. The present model was developed with reference to a three-pass smoke tube heat generator, dividing it into subsystems, which are representative of its main components. The subsystems structure of the model makes it easily adaptable to heat generators characterized by a different geometry. It can be used to predict the behavior of heat generators working in stationary and transient conditions.

KEYWORDS

Heat generator, Fire tube, Dynamic model, Experimental analysis

1. INTRODUCTION

A heat generator is an apparatus that realizes the purpose of heating a fluid (i.e. water), without achieving its boiling point, through the heat given by the products of a stationary combustion. A heat generator which causes the vaporization of the secondary fluid is called boiler. Heat generators usually have a shell-and-tube geometry, and can be divided in two macro