

## Accepted Manuscript

Experimental study on short rubberized concrete-filled steel tubes under cyclic loading

A.P.C. Duarte, B.A. Silva, N. Silvestre, J. de Brito, E. Júlio, J.M. Castro

PII: S0263-8223(15)00946-0

DOI: <http://dx.doi.org/10.1016/j.compstruct.2015.10.015>

Reference: COST 6923

To appear in: *Composite Structures*



Please cite this article as: Duarte, A.P.C., Silva, B.A., Silvestre, N., de Brito, J., Júlio, E., Castro, J.M., Experimental study on short rubberized concrete-filled steel tubes under cyclic loading, *Composite Structures* (2015), doi: <http://dx.doi.org/10.1016/j.compstruct.2015.10.015>

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.

# EXPERIMENTAL STUDY ON SHORT RUBBERIZED CONCRETE-FILLED STEEL TUBES UNDER CYCLIC LOADING

A.P.C. Duarte<sup>1</sup>, B.A. Silva<sup>1</sup>, N. Silvestre<sup>2\*</sup>, J. de Brito<sup>1</sup>, E. Júlio<sup>1</sup>, J.M. Castro<sup>3</sup>

<sup>1</sup> CERis/ICIST, Department of Civil Engineering, Architecture and Georresources,  
Instituto Superior Técnico (IST), Universidade de Lisboa, Portugal

<sup>2</sup> IDMEC, LAETA, Department of Mechanical Engineering,  
Instituto Superior Técnico (IST), Universidade de Lisboa, Portugal

<sup>3</sup> CONSTRUCT, Department of Civil Engineering,  
Faculty of Engineering (FEUP), University of Porto, Portugal

\* Corresponding author: [nsilvestre@ist.utl.pt](mailto:nsilvestre@ist.utl.pt)

---

**Abstract:** This paper presents an experimental investigation on the cyclic behaviour of short steel tubes filled with Rubberized Concrete (RuC), a composite material that mixes concrete with rubber particles. A brief literature review on the cyclic behaviour of CFST columns, the mechanical properties of RuC and recent research on RuC-Filled Steel Tubes (RuCFST) is presented. Then, the tested specimens are characterized, comprising three cross-section shapes (square, rectangular, circular), three steel grades (S235, S275, S355), three concrete mixes (0%, 5%, 15% of rubber particles content) and two axial load levels (10%, 20% of axial plastic load). After that, the loading protocol, test rig and experimental procedure are described in detail. The experimental results are extensively discussed, focusing on the column cyclic strength, failure modes, hysteretic and envelope curves, as well as on the energy-based ductility factors. Finally, conclusions are drawn regarding all these parameters. The most relevant achievement is that a concrete mix with a low content (5%) of rubber particles leads simultaneously to the lowest decrease (5%) in the cyclic strength and the highest increase (52%) in the ductility of RuCFST columns, thus being the most suitable mix to use in seismic areas, where ductility and energy dissipation requirements are mandatory.

**Keywords:** Rubberized Concrete (RuC); Concrete Filled Steel Tubes (CFST); Cyclic behaviour; Experimental testing; Strength and ductility; Local buckling

Download English Version:

<https://daneshyari.com/en/article/6706373>

Download Persian Version:

<https://daneshyari.com/article/6706373>

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