

Zeitschrift: IABSE reports = Rapports AIPC = IVBH Berichte
Band: 83 (1999)

Artikel: Thin walled steel hollow sections with concrete infill
Autor: Bhattacharyya, S.K. / Ghosh, S.K. / Maini, P.K.
DOI: <https://doi.org/10.5169/seals-62904>

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

Download PDF: 22.07.2025

ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>



Thin Walled Steel Hollow Sections with Concrete Infill

S. K. BHATTACHARYYA

Professor

University of Durban-WestVille

Durban, South Africa

S. K. GHOSH

Principal Research Manager

R&D Centre for Iron & Steel SAIL

Ranchi, India

P. K. MAINI

Research Engineer

R&D Centre for Iron & Steel SAIL

Ranchi, India

D. KARMAKAR

Principal Research Engineer

R&D Centre for Iron & Steel SAIL

Ranchi, India

Summary

To overcome the difficulties of hot rolled open steel sections, cold formed hollow sections are used as structural elements. Use of concrete as infill material for the hollow sections may overcome the difficulty of local buckling. This paper presents an experimental and theoretical study on concrete filled column members. Results show that the filled sections are much more efficient than equivalent hollow or concrete sections.

Keywords: Thin walled section; Closed section; steel-concrete composite; infilled section; Finite Element Technique; Experimental Study.

1. Introduction

The hot rolled open steel sections, used as structural members, suffer from a few drawbacks such as buckling about weaker axis, torsional instability etc. Thin walled closed sections are proved to be a viable solution in this direction. Use of infill concrete further enhances the capability of the closed sections.

Several researchers have presented their studies on the behaviour of concrete filled light gauge steel tubular members.

This paper presents an experimental study on the behaviour of concrete filled column members with circular, rectangular and square cross sections along with the development of a theoretical model for the infilled circular section.

2. Experimental Study

An experimental study has been performed with the circular, square and rectangular sections to study the behaviour of the closed form infilled sections. The columns are tested under direct compressive load. Fig.1 shows the test set up and arrangement adopted for testing the specimens.

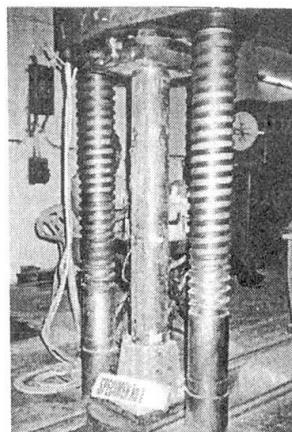


Fig.1: Arrangement for Testing Columns

3. Theoretical Formulation

The circular infilled section is analysed using finite element technique. A computer code is developed for the analysis of concrete filled closed circular columns.

4. Results & Discussion

The results of observed strain data and of theoretical analysis are presented in graphical form.

5. Conclusions

Based on the experimental study and theoretical analysis a set of meaningful conclusions are drawn.

6. References

- [1] Bolterman Peter, "Short Thin-walled cylinders under combined loading.", *ASCE Journal of Structural Engineering*, Vol.117, No.3, 1991, pp. 951-971.
- [2] Chan S. L., "Strength of cold-formed box columns with coupled local and global buckling" - *Journal of The Inst. of Structural Engineer*, 1990, pp.125-131.
- [3] Dutta B. and S. K. Bhattacharyya, "An experimental study on the behaviour of concrete filled light gauge steel tubular members", *Indian Concrete Journal*. Vol.69, No.8, 1995.
- [4] Hanbin Ge. and T. Usami T., "Strength of concrete filled thin-walled steel box columns: experiment", *ASCE Journal of Structural Engineering*, Vol.118, No.11, 1992, pp.3036-3054.