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Design of concrete-filled steel tubular (CFST) hybrid structures

Conception de structures hybrides en tubes d'acier remplis de béton (CFST)

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Foreword

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Introduction

Concrete-filled steel tubular (CFST) hybrid structures employ CFST members as their main members, and construct with steel or reinforced concrete members or components to act compositely. They consist of trussed CFST hybrid structures, concrete-encased CFST hybrid structures, etc. The economic and environmental benefits of CFST hybrid structures have made them one of the desirable structural types for constructions in relatively tough and harsh conditions, such as mountainous areas, earthquake-prone regions, corrosive environments, and less-developed regions. They can also be used in conventional structures, such as multi-storey residential buildings and relatively short-span bridges.

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Design of concrete-filled steel tubular (CFST) hybrid structures

1 Scope

This document provides guidelines for the design, construction, and inspection of concrete-filled steel tubular (CFST) hybrid structures. These structures can be used as main structural components like columns, girders, piers, or arches in buildings, bridges, especially in high-rise structures, long-span spatial structures, and large-scale bridges.

CFST hybrid structures can employ CFST members with a circular cross-section as their chords, and they can also use square or rectangular CFST chords.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes the requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19338, *Performance and assessment requirements for design standards on structural concrete*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
concrete-filled steel tubular hybrid structure
CFST hybrid structure
structure in which concrete-filled steel tubular (CFST) members serve as its main members, and are in contact with and act compositely with steel or reinforced concrete members or components, including trussed CFST hybrid structure, concrete-encased CFST hybrid structure, etc.

Note 1 to entry: CFST hybrid structures more frequently employ circular CFST members due to the higher confinement effect provided by circular hollow steel tubes to the core concrete; square or rectangular CFST members can also be used when design or construction conditions require. CFST members require full composite effects between steel tubes and the core concrete. Steel tubular members using infilled concrete to only enhance their stiffness are beyond the scope of this document.

3.2
trussed concrete-filled steel tubular (CFST) hybrid structure
trussed CFST hybrid structure
truss structure consisting of CFST chords and webs of steel tubes, CFST members or other steel profiles

Note 1 to entry: There are two-chord, three-chord, four-chord and six-chord trussed CFST hybrid structures (see Figures 1 and 2), and the chords are normally placed symmetrically. Trussed CFST hybrid structures generally serve as main structural members, such as truss girders, bridge piers or columns.

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