

H 型鋼柱接擴翼鋼梁抗彎接頭 之耐震行為與設計

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摘 要

以梁腹板螺栓接合與梁翼板全滲透銲接之傳統抗彎構架，在經歷北嶺及阪神地震的侵襲下，於梁柱接頭處發生嚴重脆性破壞。震後研究顯示傳統梁柱接頭韌性能力不足，並提出多種梁柱接頭之改良方式。本研究針對 H 型鋼梁接 H 型鋼柱之傳統式梁柱接頭，提出以擴大接頭處梁翼板寬度之改良方式，改善扇形開孔處與梁翼全滲透銲道之應力集中現象。此梁柱構架之施工方式為：鋼梁兩端於工廠各續接一段擴翼式短梁，完成之全梁至現地再與柱進行接合；擴翼式短梁之梁翼板，是以圓弧漸進方式裁切而成。藉由參數研究確立各設計參數範圍，並製作六組實尺寸試體進行試驗加以驗證。實驗結果顯示，試體皆可於擴翼圓弧末端產生塑性鉸，提供優良且穩定之極限彎矩強度及韌性能力，並符合國內外規範對抗彎構架塑性轉角之要求。

關鍵字：脆性破壞、應力集中、扇形開孔、擴翼式短梁、塑性鉸

Seismic Behavior and Design of Steel Moment Connections between H-shaped Column and Beam with Widened Flange

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ABSTRACT

During the 1994 Northridge and the 1995 Kobe earthquakes, great amounts of steel moment connections used in moment-resisting frames, traditionally having web-bolted and flange-welded connection details, were damaged with significant brittle fracturing. These beam-to-column connections had insufficiently ductile behavior under the strong seismic excitation. Extensive studies were therefore conducted to improve the ductility of the moment connection. This study focuses on numerically and experimentally investigating the performance of connections between an H-shaped beam and an H-shaped column. By widening the beam flange at the beam-to-column joint, the proposed improved scheme is intended to reduce the stress and strain demands at the weld access hole region and beam flange groove welds. Experimental study of six full-scale specimens, one specimen with pre-Northridge connection and five specimens with widened flange, was conducted to clarify their hysteretic responses. The test results demonstrated that the widened flange connection, with the sufficient beam flange enlargement, can notably achieve the required ductility and strength by diminishing the fracture potential in the beam-to-column connection.

Keywords: steel moment connection, widened flange, brittle fracture, stress concentration, weld access hole, plastic hinge.

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