

COMPRESSION TESTS ON STOCKY WELDED H-SECTIONS MADE OF Q690 STEEL MATERIALS

Kai Wang, Yi-Fei Hu, Tak-Ming Chan and Kwok-Fai Chung

*Department of Civil and Environmental Engineering,
The Hong Kong Polytechnic University, Hong Kong SAR, China*

ABSTRACT

This paper presents an experimental investigation on the cross-section behavior of stocky welded H-sections made of Q690 steel materials under compression. A total of nine welded H-sections with different cross-sectional dimensions were tested under axial compression. Full load-end shortening curves of the tests were measured while plastic local plate buckling was apparent in the flange outstands in all tests. Tensile coupon tests were also conducted to measure the material properties of the Q690 steel plates for subsequent data analysis according to the design rules given in EN 1993-1-1. Comparison between the measured cross-section resistances obtained from the tests and the predicted cross-section resistances showed that these design rules are readily applicable. Moreover, according to the section classification rules given in EN 1993-1-1, these welded H-sections are classified into three classes: Classes 1, 2 and 3, depending on the outstand-to-thickness ratios of the flanges. It is noted that Class 3 sections often possess lower ductility when compared with Class 1 and Class 2 sections due to local buckling. As verified with collected data, high ductility will contribute additional cross-section resistances under compression in stocky sections owing to excess strain-hardening.

Keywords: High strength steel; Stocky welded sections; Local buckling; Section classification; Deformation capacity.