

Reliabilities of distances describing bolt placement for high strength steel connections

Abstract

In the bolted connections, bolt placements are generally described and are generally made in the direction of design effects and in the perpendicular direction to design effects. In these both directions, the reliability of the distance of bolts to the edges of connection plate and the distance of bolts to each other is investigated for high strength steel connections built up with high strength bolts in this study. For this purpose, simple SL (bearing type shear connection) and SLP (bearing type shear connection for body-fit bolts) type steel connections with St 52 grade steel plates with 8 different thicknesses and with 8.8D grade high strength bolts (HV) were constituted and analyzed under H (Dead Loads+Live Loads+Snow Loads+ Roof Loads) and HZ (H Loads+Wind Loads+Earthquake Loads) loadings. Geometric properties, material properties and design actions were taken as random variables. Monte Carlo Simulation method was used to compute failure risk and the first order second moment method was used to determine the reliability indexes of those different distances describing the placement of bolts. Results obtained from computations have been presented in graphics and in a Table. Then, they were compared with some values proposed by some structural codes. Finally, new equations were constituted for minimum and maximum values of distances describing bolt placement by regression analyses performed on those results.

Key Words

reliability analysis; bolted connection; bolt distance; bolt placement; monte carlo simulation

Address

Ertekin Öztekin: Department of Civil Engineering, Gumushane University, Baglarbasi 29100, Gumushane, Turkey