

Prospective Future of Frame Fire Tests

Authors : Chung-Hao Wu, Tung-Dju Lin, Ming-Chin Ho, Minehiro Nishiyama

Abstract : This paper discusses reported fire tests of concrete beams and columns, future fire tests of beam/column frames, and an innovative concept for designing a beam/column furnace. The proposed furnace could be designed to maximize the efficiency of fire test procedures and minimize the cost of furnace construction and fuel consumption. ASTM E119 and ISO 834 standards were drafted based on prescriptive codes and have several weaknesses. The first involves a provision allowing the support regions of a test element to be protected from fire exposure. The second deals with the L/30 deflection end point instead of the structural end point (collapse) in order to protect the hydraulic rams from fire damage. Furthermore, designers commonly use the measured fire endurance of interior columns to assess fire ratings of edge and corner columns of the same building. The validity of such an engineering practice is theoretically unsound. Performance-Based Codes (PBC) require verification tests of structural frames including the beam/column joints to overcome these weaknesses but allow the use of element test data as reference only. In the last 30 years, PBC have gained global popularity because the innovative design and flexibility in achieving an ultimate performance goal.

Keywords : fire resistance, concrete structure, beam/column frame, fire tests

Conference Title : ICACE 2015 : International Conference on Advances in Civil Engineering

Conference Location : Chicago, United States

Conference Dates : October 08-09, 2015