

Performance of base connections for concrete segmental communication tower

ABSTRACT

Demand for communication towers has increased in the last several years due to revolution in the networking domain. Recently, advancements in the field of material and structural engineering have yielded several types of concretes such as ultra-high performance fibre-reinforced concrete (UHPFRC) which is particularly used for special structures. Generally, the connection of concrete segments in the foundation is constructed through dry joints with appropriate shear strength for transferring the imposed lateral loads such as wind loads, earthquake or vibrations from the structure to the foundations. Therefore, the connection in the foundation is considered as the critical point in a cylindrical tower because the height of the tower causes huge lateral load. This study presents an experimental and FE simulation to investigate the behavior of circular flange-bolted connections (CFBCs) as a common connection for precast segments of a hollow section tower subjected to a lateral cyclic load. On this basis, a precast UHPFRC communication tower located in Ipoh, Malaysia is considered. Results of experimental tests and numerical analyses showed a close agreement with each other. According to the test results, the foundation connection with bolts and epoxy demonstrated resistance against high lateral forces when lateral cyclic loads were applied.

Keyword: Ultra high performance fiber reinforced concrete; Circular flange bolted connection; Communication tower; Lateral shear capacity