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Effect of the concrete strength on the concrete-steel bond in concrete filled steel tubes

[*nahmat . khodaie* نهمت خدائی معصوم آباد]

Key words: *composite structures, concrete filled steel tubes (CFST), bond strength*

Abstract
In this study the concrete-steel bond strength of concrete filled cylindrical steel tubes has been experimentally investigated. 22 short, high strength and normal concrete filled circular steel tubes were tested. Push-out test was carried out as the common method to evaluate the bond carrying capacity. Four different mixes of concrete were used in preparing the specimens. The steel tubes were welded type with the nominal inside diameters of 3, 4, 6 and 8 inches. According to the test results, bond strength increases with reduction of the w/c ratio of concrete mixes. The high strength to normal concrete bond strength ratio increases with diameter of steel tubes. The bond strength decreases for higher diameters in both normal and high strength concrete specimens.

1. INTRODUCTION

Concrete filled steel tubular (CFST) columns have been extensively used in modern structures, such as bridges, marine structures, warehouses and high-rise buildings in recent years. Greater stiffness, higher buckling capacity, high ductility, smaller sections and weights, and economical benefits are some advantages of CFST columns over other columns. In the CFST columns, bond strength between concrete and steel plays a major role in the composite structural action. For bridges, wharves and other similar structures with steel piles and concrete deck, force transfer between piles and deck usually takes place in the concrete filled regions of top of piles, therefore it is important that the steel and concrete to bond well to insure high durability and strength of the connection zone.
Some research works have been carried out on the bond strength of CFSTs. Push-out test is the common method to evaluate the bond carrying capacity. Some results of the studies are as follow:

- *The bond strength is dependent on several factors including age, size, curing and temperature. Age of the concrete is a major factor of bond reduction in composite columns. The bond strength at the age of one year is approximately 30% of that at the age of 21 days. Rusting of steel at the surface of contact with concrete increases the*