

Behaviour of Tendon Anchorage Zone for Ultra-High Performance Concrete Members

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Summary

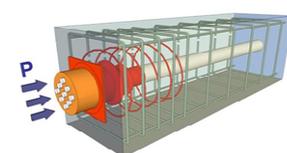
This study investigates the reinforcing details for the design of anchor blocks with post-tensioning tendons. Finite element analysis on design parameters - dimensions of anchor head and specimen block, reinforcing amount of spiral and transverse confinement steel – was carried out for understanding the stress distribution in the anchorage zone of ultra high performance concrete (UHPC) blocks. Experimental validation of design of anchor blocks for post-tensioning tendons was also carried out to consider the optimal details and dimensions of UHPC end blocks. The obtained results validate the simplification of anchor block details as well as the innovative design of UHPC members with post-tensioning tendons.

Keywords: post-tensioning; anchorage zone; ultra high performance concrete; UHPC

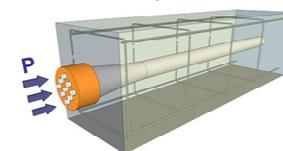
1. Introduction

The stress distribution around the anchorage zone during the introduction of prestress may differ from that of ordinary concrete members when using high strength materials like ultra high performance concrete (UHPC). Such difference implies that economically efficient structural design solutions should be proposed for the anchorage zone through improved arrangement details of the reinforcing bars and reduction of the amount of rebar. In addition, it is noteworthy that the anchoring system currently used for prestressing has been developed for ordinary concrete, which means that improvement of the modular system should be brought to secure economic efficiency through the reduction of the size of the anchor plate.

Fig.1 compares the concepts underlying the arrangement and reinforcement details of the anchorage zone of an ordinary concrete member and a UHPC member. In the case of ordinary concrete, transverse reinforcement and spiral reinforcing bars are arranged to strengthen the neighborhood of the anchorage zone against splitting and bearing stresses, which result in the need for complicated reinforcement arrangement details. Besides, for UHPC, the bridging effect of the steel fibers enables to resist to the stress distribution surrounding of anchorage zone and



(a) Ordinary concrete



(b) UHPC

Fig. 1: Details of anchorage zone reinforcement for post-tensioning tendon