

Design and detailing of durable and sustainable Post-Tensioning structures with polymer ducts according to *fib* bulletin 75

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Abstract

In order to build durable and sustainable prestressed concrete bridges and structures, preventing the steel components and the tendons from corrosion is key. Accordingly, for bridges with internal bonded post-tensioning, polymer duct systems should be used. The article gives an overview of the 50-years history of plastic ducts in post-tensioning, the selection of tendon protection levels (PL's) according to *fib* bulletin 33 [1] and information for structural engineers regarding design and detailing of concrete structures with polymer ducts according to *fib* bulletin 75 [2].

Keywords: post-tensioning; *fib* bulletin 75, plastic ducts, corrosion protection, fatigue resistance, prestressed concrete bridge

1 Introduction

Polymer duct systems for internal bonded post-tensioning enjoy growing popularity as one of the key components for corrosion resistant, durable and therefore sustainable concrete bridges. *fib* Bulletin 75 "Polymer-duct systems for internal bonded post-tensioning" [2] was issued in 2014 and is considered a cornerstone for technical approval process of polymer or plastic ducts. It provides information for the structural engineer regarding design and detailing of concrete structures containing post-tensioning tendons with corrugated plastic ducts.

2 History of plastic ducts

The use of plastic ducts for internal bonded post-tensioning began in Switzerland. Between 1968 and 1974, around 300.000 m of corrugated black PE pipes were installed in highway bridges and overpasses [2].

One of the first major bridge projects to utilise plastic post-tensioning duct is the Chillon Viaduct, see Figure 1.

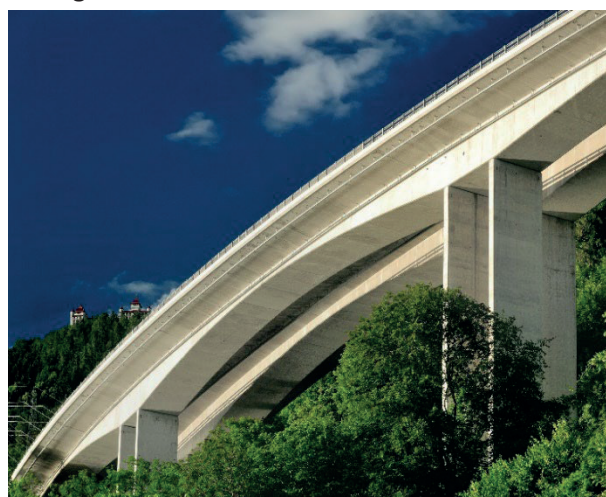


Figure 1. Chillon Viaduct
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This structure is located at the eastern end of Lake Geneva and is part of the Swiss A9 motorway. It was completed in 1969 and consists of 23 spans