

12. Construction of Tunnel Lining with Middle Performance Concrete Using Superplasticizer Mixed with Viscosity Agent

Atsuo Matsuda, Kazutami Oono, Mitsuyoshi Takemoto, Tetsuya Hironaka

Lining was constructed in the Tagami Tunnel on the Maizuru-Wakasa Expressway using concrete with a well-balanced provision of high fluidity and segregation resistance by a superplasticizer mixed with a viscosity agent, which is generally known as middle performance concrete. Replacing only the chemical admixtures, one of the conventional lining concrete components, could produce semi self-compacting concrete that filled the form for tunnel lining through the vibration of form vibrators.

Changes in slump, slump flow and air content were measured in the phases of transport from factory, input of plastic fiber and pumping to set the characteristic values during manufacturing. As a result, stable concrete was supplied. The strengths of concrete at an age of 16 to 24 hours, which was required for removing the form, and at an age of four weeks were equivalent to the strength of ordinary concrete.

The strength distribution in the lining with middle performance concrete in the direction of tunnel axis in the tunnel arch varied less than the strength distribution in the lining with ordinary concrete.

Key words: middle performance concrete, viscosity agent, slump flow,
changes in fresh concrete characteristics with time, homogeneousness