Requirements on fastening systems for slab track with rail on the surface and practical examples

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ABSTRACT

In general railroads use rails supported by sleepers attached via baseplates to distribute the acting loads. On traditional ballasted track, the rail is mounted onto wooden or concrete sleepers. The sleepers sit on a bed of ballast (crushed rocks) which distributes the loading to the subgrade. “Top” ballast is placed between the sleepers and on the shoulders to provide longitudinal and lateral stability. Ballasted track is relatively quick to lay, and readily maintained by a fleet of special track maintenance equipment. However the nature of ballasted track means that the track can and will move under load by the running trains; routine maintenance is always required to restore line and level, and clean or replace ballast regularly.

With the growth of traffic intensity it becomes more and more difficult to carry out maintenance work and renewal work. As a result ballasted track concepts lost and will continue to loose attractiveness in favor of slab track systems (ballastless track).

With concrete slab track systems the ballast is replaced by a rigid concrete track slab which transfers the load and provides track stability. The necessary elasticity - to distribute the axle loads of the train and to provide an adequate comfort for passengers - is provided by elastic elements (elastic pads) situated under the baseplate or sleepers. Slab track offers numerous advantages over traditional ballasted track like low maintenance requirements, shallow construction depth as requested in case of tunnels, and reduced dead loads as requested for rails running on bridges. There are numerous types of generic slab track systems (e.g. ERS, booted sleepers) while the presentation will take account of the modular system where the baseplate with its components is fasten with direct fixation fasteners (DFF) on the reinforced concrete slab track.

A short overview will be given concerning the different construction method and requirements stated in the relevant European standard for these fastening systems. In addition practical examples will be discussed where DFF systems were successfully be used.

Keywords: Anchors, Slab track, direct fixation fasteners (DFF)