

Einsatzmöglichkeiten von selbstbohrenden Rohrschirmsystemen im Tunnelbau

Fields of application for self-drilling pipe umbrella systems in tunnelling

Günther M. VOLKMANN

DYWIDAG-Systems International GmbH

Alfred-Wagner-Strasse 1

4061 Pasching

Austria

Cell: +43 676 9284774

Fax: +43 7229 61049 80

email: Guenther.Volkmann@DYWIDAG-Systems.at

Abstract

Pipe umbrella systems have been used as a pre-support system in conventional tunnelling in weak ground conditions during the last decades. Thus, considerable experience in urban tunnelling with shallow overburden with those systems exists. This support system is also successfully used when a tunnel alignment crosses fault zones, sediments, moraines or talus with overburdens from shallow to deep. The pipe umbrella support method itself is termed differently worldwide - synonyms are canopy tube umbrella method, umbrella arch method, or long forepoling method.

One main reason for the increase in application is that this support system closes cost-effectively the gap between cheaper, normal supported tunnels and tunnels supported with expensive special techniques like horizontal jet-grouting or ground freezing. So, many projects can be built more cost effective without decreasing the level of safety by using this system.

Research on this relatively young method led to a considerable increase in understanding the interaction between support and surrounding ground, the mode of function, and the important details for construction. Thus it is necessary to give an overview about the system and its correct application in conventional tunnelling. This part will include the modes of function, design parameters and different application possibilities. This system is usually used when stability conditions get critical during construction so it is very necessary to get what the design had foreseen during construction. So, specific and relevant points for tender documents will be the second focus.

While pipe umbrella systems are in successful use in conventional tunnelling for some decades, recent developments show that these special measures are being requested and used more often in mechanized tunnelling (TBM) as well. According to the type of pipe used, the system can be applied to support the surrounding ground, for grouting measures, for drainage or also combinations thereof. TBMs always call for special system solutions so possible combinations of different casing tubes and their correct application depending on ground conditions will be discussed as third focus.

Hence, the goal for this presentation is to give an overview for applications of self-drilling pipe umbrella systems that starts at the design phase and ends with correct construction application in conventional as well as TBM tunnelling.