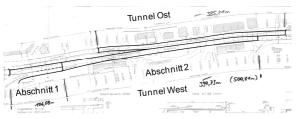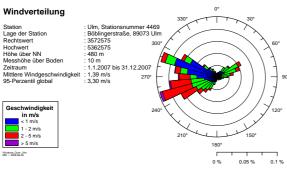# Bismarckring Tunnel Ulm (DE)
Tunnel ventilation feasibility study

Covered Road Section and Entry Portal of the Bismarckring Tunnel in Ulm

Tunnel Geometry Overview

Measured Wind Chart for the City of Ulm 4 Wind Speed Classes, 36 Wind Direction Classes

Description

The Bismarckring Tunnel Ulm consists of two tunnels of 385 m (northbound) and 501 m (southbound). It is used in uni-directional traffic on two lanes per tunnel. The southbound tunnel includes an entry section built as a covered road (see picture). A further covered section is constructed between the exit from the southbound tunnel and the entry of the northbound tunnel.

The tunnels had to be refurbished according to the current edition of the German National Standard RABT-2006. Prior to the refurbishment works, HBI Haerter conducted a feasibility study for the tunnel ventilation system. In the study, the risk was to be analysed that is inherent to the covered road sections. For the complicated geometry, the conformity of the design to the safety level of the standard had to be proven.

Services

From the analysis of the traffic, project and wind data, the following design parameters were derived:
-   Maximum heat release rate 30 MW, smoke production up to 80 m³/s
-   Pressure difference due to buoyancy of the hot smoke up to 16 Pa
-   95 percentile met. pressure 5 Pa

As a result of the aerodynamic analysis and risk assessment, the following recommendations were given:
-   The covered section at the southern portal has to be closed forming an extension to the tunnel.
-   The number of emergency exits exceeds the requirements of the current national standard. However, they shall be maintained as the exits contribute significantly to the safety level of the system.
-   The Bismarckring Tunnel does not require a mechanical ventilation system. According to the feasibility study, an extensive quantitative risk analysis is not required at this time. The risk level should be analysed if con-ditions (e.g. as traffic flow) change significantly.