

Class I, Div. 2 Certified Control for Tunnel Boring Machines

Reliable Purge and Pressurization
for Large-Volume Enclosure
Solutions

At a Glance

- Application-specific solutions for electrical explosion protection
- Purge and pressurization systems with global approvals
- Optimal solution for large-volume enclosures and components with high power dissipation
- Engineering and project support from the design phase through to product acceptance
- Application-related certification for individual solutions

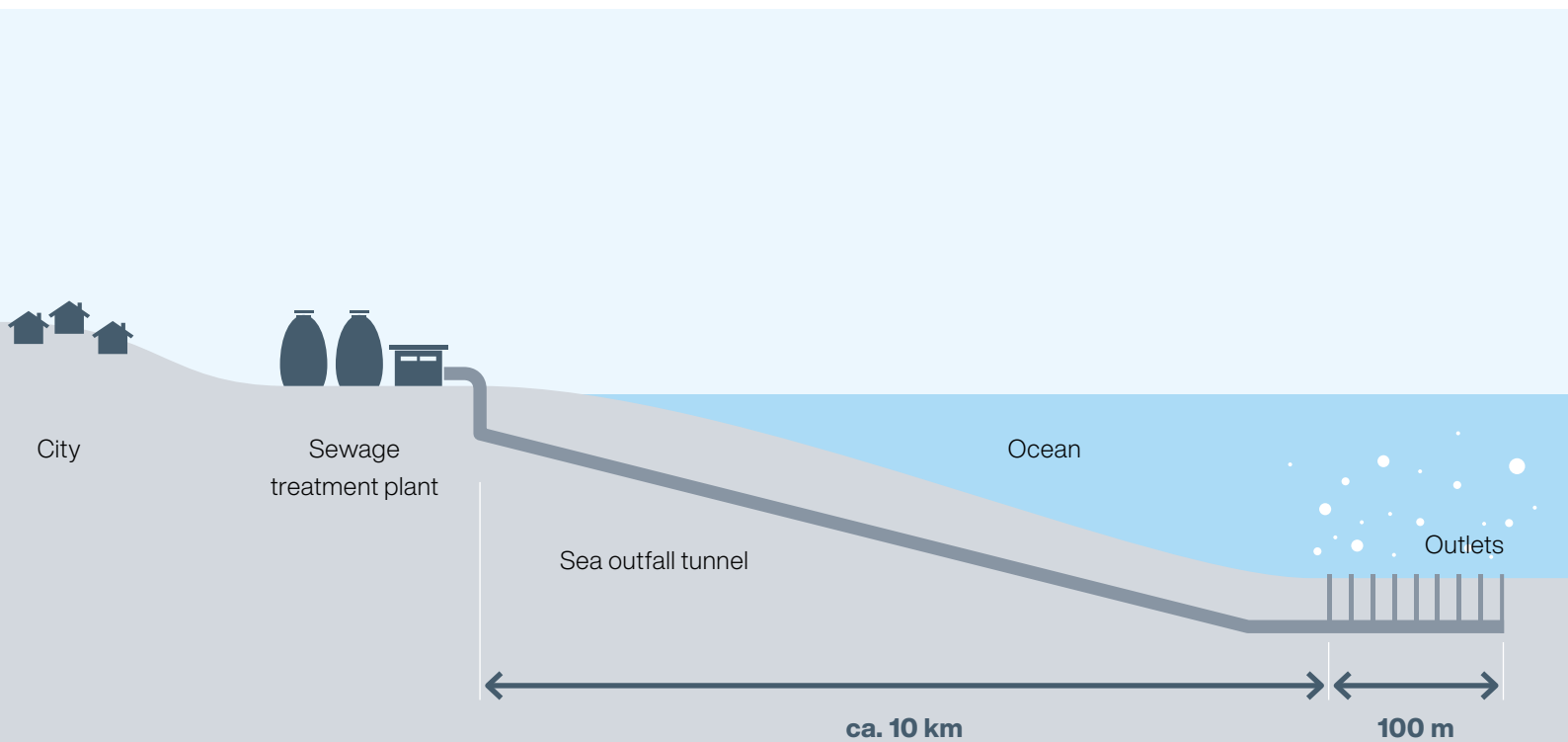


The Application

Nowadays, infrastructure is created increasingly underground. Tunnels and shafts are produced using large tunnel boring machines. During tunneling, it is possible for methane to escape from the rock or for a potentially explosive dust atmosphere to be created at any time. Therefore, electrical machines and equipment may only be operated underground with reliable explosion protection. The tunnel boring machines can be over 100 meters long and their complex control systems require cabinets stretching several meters.

The Goal

The drilling machine and all control and power supply units must comply with explosion protection requirements and regulations, which may vary depending on the country and region. The ignition protection equipment used must function reliably and have the certification required at the operating location. In addition, many components with high power dissipation must be accommodated in the controller, such as frequency inverters and PLCs. This means that the large amount of waste heat from these powerful components must also be removed from the controller.



Schematic representation of a sea outfall tunnel

The diluted wastewater is discharged offshore. Microorganisms then break down the remaining substances that are still present.

The Solution

Due to the size of the control cabinets, the only type of protection usually considered for tunnel boring machines is purge and pressurization. Owing to their size, conventional enclosures are used that have been modified for use in explosion-protected environments, for example by sealing to ensure the necessary degree of protection (IP). In addition, a special roofing to protect against dirt will be retrofitted along with reinforcements intended to prevent overpressure. There is a separate cooling system to control the waste heat, which draws the warm air from the inside of the enclosure, cools it down via an internal circuit, and then returns it back to the enclosure. After the components are installed, the enclosure is purged with an inert gas or clean air. An overpressure of several millibars is then established inside the enclosure. The enclosure, valve, and enclosure protection vent of the system ensure that no flammable gas can enter the enclosure.

The Benefits

The customer receives a fully certified and ready-to-use solution, which is approved during a joint meeting. The project engineers at Pepperl+Fuchs provide support during every stage of the project in close coordination with the customer, and the customer always stays in control. From the design phase to joint final approval, requests for changes and adjustments are discussed directly and quickly and implemented according to the customer's needs.

When it comes to large-volume enclosures, purge and pressurization provides optimal explosion protection and simplifies the integration of components with high power dissipation. Products in the purge portfolio from Pepperl+Fuchs automatically maintain pressure levels and therefore ensure explosion protection.

Pepperl+Fuchs is a pioneer in explosion protection and offers a unique, complete service through a combination of Ex products and tailored engineering, including full certification and the construction of enclosure solutions in accordance with ATEX, IECEx, and NEC directives. The company is UL HazLoc listed and authorized to manufacture distribution panels with UL Class I, Division 1 and 2 approval.

For more information, visit: pepperl-fuchs.com/px-ep-purge

Canopy for the purge system 6000 with approvals for Zone 1, 21 and Class I, Division 1



Attached base (black) and brackets for the bottom plate

