

Carbofol® Secutex®

Base sealing system

Project name
Central Landfill Ennigerloh - Landfill cell 15,
Ennigerloh, Germany

Client
AWG Abfallwirtschaftsgesellschaft des
Kreises Warendorf mbH, Ennigerloh, Germany

Designer
IWA Ingenieurgesellschaft für Wasser- und Abfallwirt-
schaft mbH & Co. KG, Münster, Germany

Construction company
Arbeitsgemeinschaft Zentraldeponie Ennigerloh,
Germany

Installation sealing system
Naue Sealing GmbH & Co. KG, Bückeberg, Germany

Products
Carbofol® 510 2.5mm G/G BAM
Carbofol® 510 2.5mm MF/MF BAM
Secutex® RZ 2221

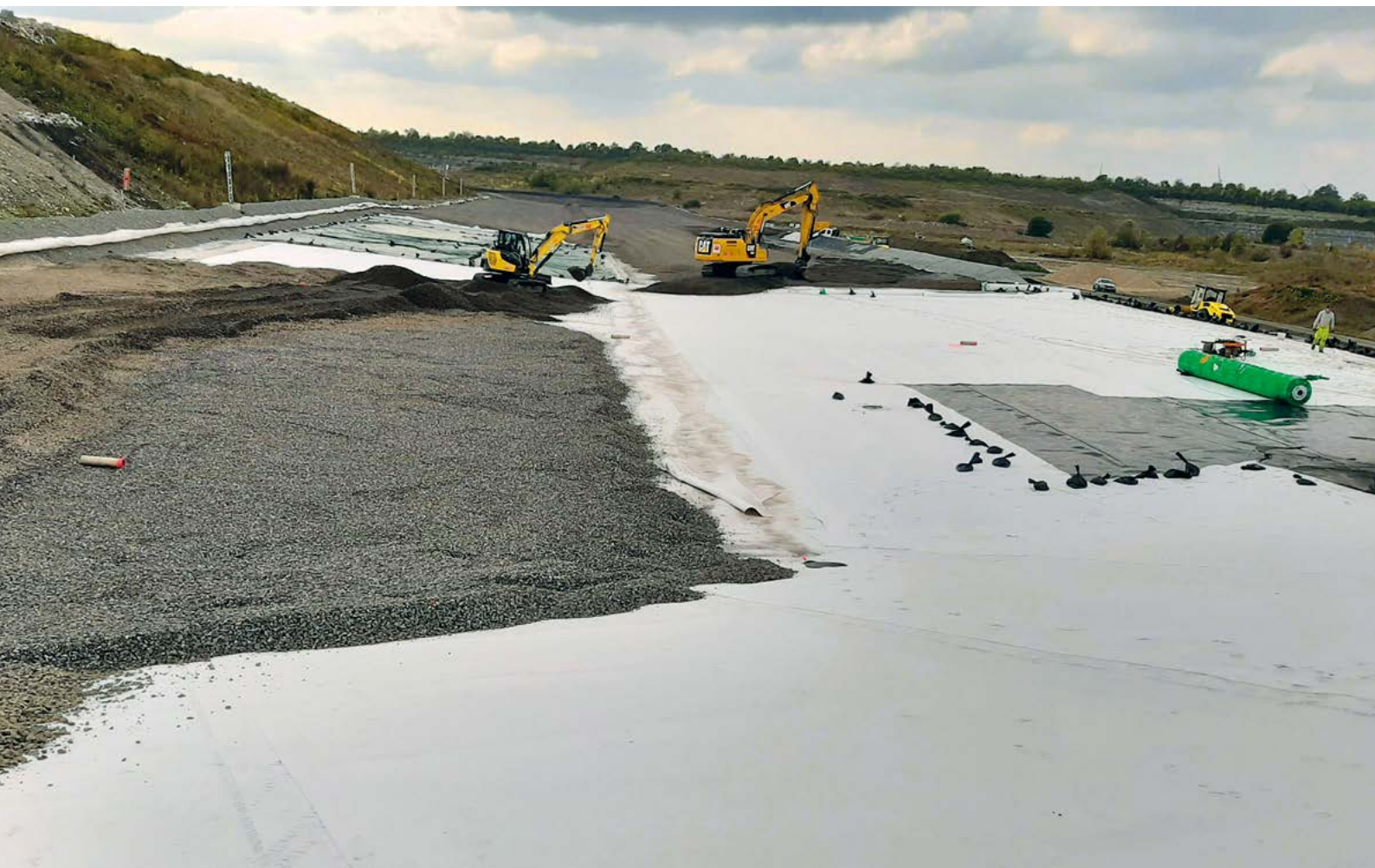




Fig. 1: Installation of the geomembrane



Fig. 2: Pipe penetration

The central landfill of the Ennigerloh waste management centre is located on a former limestone quarry site. It was put into operation in 1981 and had a planned area of 44ha with a backfill volume of approximately 6.5 million m³. Mechanically and biologically treated waste from the districts of Warendorf, Gütersloh, Soest and Borken (all located in Germany), as well as mineral waste from the communities of Warendorf and Gütersloh, is deposited at the landfill. In addition, waste fractions suitable for disposal are obtained from the entire state of North Rhine-Westphalia and neighbouring federal states. The Ennigerloh central landfill is assigned to landfill class II. The operation of the landfill is authorized under licensing law until 2032.

Challenge

After the end of quarry operations, a rock layer of more than 30m thickness remains, which already has a natural gradient and serves as a geological barrier for base seals. The required engineering solutions for the expansion sections and the implementation of the construction measures must be planned in time to be able to guarantee disposal security.

Solution

Since the existing fill areas are already filled, new landfill volume must be generated. The starting point for landfill cell 15 is the existing rock layer as a geological barrier. This layer was built up as follows:

First, a geotechnical barrier with a permeability coefficient in the installed state of $k_f \leq 1 \times 10^{-9}$ m/s is installed in a minimum thickness of 1m. This layer must be thick enough to retain pollutants.

A mineral sealing layer is applied over this geotechnical barrier in two layers of 25cm each (D = 0.5m). This layer consists of clay (according to suitability certificate BQS 2.0) with a permeability coefficient of $k_f \leq 1 \times 10^{-10}$ m/s.

The 2.5mm thick HDPE geomembrane with BAM approval is installed in a press bond on the mineral seal, welded and then tested.

In landfill cell 15, a BAM-approved protection nonwoven with a mass per unit area of $\geq 2,000\text{g/m}^2$ protects the geomembrane from damage resulting from the overlying drainage layer. This consists of a track ballast with a grain size of 8/32mm and the additional load from the landfill.

The approved fill height at the highest point of the landfill is approximately 30m and thus 126m above sea level (height above sea level).



Fig. 3: Installation of geomembrane, nonwoven and drainage layer



Fig. 4: Finished drainage layer