

1. Transportation and storage

The tunnel elements are stored and transported with up to 40 pieces (element dimensions = L 1.15 m x W 0.75 m x H 0.5 m) per pallet. The pallet dimensions of 1.2 m x 0.8 m correspond to the Euro pallet dimensions.

The intermediate storage before installing the elements should be done standing on a level surface. During the incoming goods inspection and when installing the elements, care must be taken to ensure that there is no transport damage. Impact sensitivity increases, especially in frost and low temperatures. Damaged tunnel elements must not be installed.

2. Creation of excavation pit and planum

An excavation pit is created according to DIN 4124 (excavation pits and trenches). The width of the bottom of the excavation should be at least 1 m. When laying in several rows, the distance between the rows is 0.5 m. The width of the excavation pit must be designed accordingly.

A dry, compacted, drainable, load-bearing and leveled fine subgrade is to be produced as the base of the excavation pit. The blinding layer consists of crushed sand, chippings, or coarse sand without fine grain fractions (grain size 2-5 mm) with a thickness of 2-5 cm. The permeability of the compacted blinding layer must at least correspond to the permeability (kf value) of the in-situ soil. The degree of compaction of the blinding layer and subsoil Dpr should be $\geq 97\%$ (EV2 ≥ 45 MN/m² or CBR $\geq 12\%$ upper edge of support).

The condition of the base of the excavation has a significant influence on the load-bearing and settlement behavior of the tunnel trench.

3. Layering out the geotextile

The base of the excavation pit is lined with 2.5 m wide geotextile so that when the elements are inserted it protrudes 10 cm over a tunnel side wall. After turning over, the all-round encasing and protection against sand flushing is provided. At the ends, the geotextile should protrude approx. 1 m over the tunnel trench.

4. Installation HeitkerTunnel

The tunnel elements are placed on the geotextile and hung together in a row using molded hooks. After the tunnel elements have been laid, the start and end of the drainage line is provided with an end wall. When laying several tunnel trenches next to each other, for an effective seepage performance the lateral distance should not be less than 0.5 m. The tunnel strands are connected with KG material via the upper connections in the end walls, which creates a positive multi-chamber effect.



5. Covering with geotextile

After all the tunnel elements are laid and end walls are fitted at the ends, they are wrapped in geotextile from side to side. Care must be taken to ensure that there are no gaps between the existing soil layer, so that no soil is washed in.

6. Installation inlet pipe

The inlet pipe is connected to the end wall of the tunnel in the desired nominal width (DN 110 to DN 250). The cut can be made with a jigsaw. When cutting open the geotextile (X-cut), care must be taken to ensure adequate tightness to avoid soil being washed in.

7. Installation vent and filtershaft

The deaerator is laid opposite the inlet / filter shaft with a DN 110 pipeline with a slight incline to the destination. The filter shaft required for the long-term function (cover walkable, not lockable) is piped to the end wall according to the connections used.



8. Backfilling of the excavation pit

The backfill begins with the application of material **over the top** of the tunnel trench to prevent shifting. It is filled above the crest until a horizontal cover of 30 cm is reached above the tunnel elements. Then it is compacted with a surface vibrator up to 150 kg.

Trucks up to 3.5 t can be driven on from a compacted cover of 0,8 m above the top of the tunnel trench including a structure in accordance with RStO 12.

Trucks up to 7.5 t can be driven on from a compacted cover of 1 m above the top of the tunnel trench including a structure in accordance with RStO 12.

The maximum earth coverage is 1.5 m.

Crane vehicles or other loads must not be positioned in the trench area.

When installing under traffic areas, guidelines – such as e.g. B. the RStO 12 – to be observed. To create the subgrade for the trafficked surface, a cover must be installed - preferably a gravel base layer of at least 35 cm. Other materials usually lead to greater coverage heights. The surface of the cover (planum) must achieve a uniform deformation modulus $EV2 \geq 45 \text{ MN/m}^2$ or $CBR \geq 12\%$.