



Construction guidelines for storage tanks

*Horizontal type DN/ID1000, DN/ID1200 & DN/ID1600
for underground construction.*



Preparations

Before installing the tank, it is necessary to prepare the base of the trench.

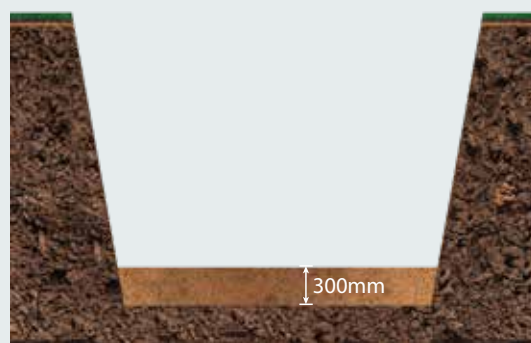
The most suitable materials for the construction of the base are gravel and crushed stone. The material used must be clean, free-flowing and free of ice, snow, clay, organic matter or objects that are too large or heavy to damage the tank if they fall on it. The minimum required bulk density shall be 1500 [kg/m³].

Gravel

Gravel particles must not be smaller than 3 [mm] or larger than 20 [mm].

Stone chippings

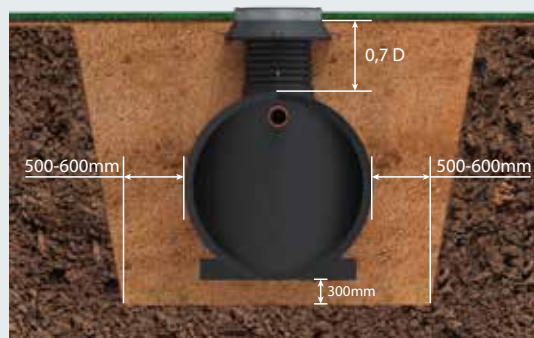
The particle size of stone chippings shall not be less than 3 [mm] or more than 16 [mm].



preparations

It is not recommended to use sand or excavated natural soil for backfill. Sand and natural soils have the property to leach out over time, which may result in a reduction of the bearing capacity of the tank due to leaching, which in turn may cause deformation or settlement of the tank.

Installation of the tank



installation

1. The trench for the tank shall be 1-1,2 metres longer and wider than the dimensions of the tank. This allows for a 0,5-0,6 [m] wide strip around the tank to allow free access during construction and the possibility to compact the backfill material.
2. The installation depth of the tank shall be measured according to the depth of the connection pipe leaving the starting point of the route. The drop of the connection pipe between the starting point and the tank shall be 1-2 [cm/m].
3. The base of the trench must be prepared by placing and compacting a 300 [mm] thick layer of fill material (see section 'Preparation work').

4. If the tank needs to be anchored, see "Anchoring". Under normal conditions (water table should be within 0,5 [m] from the bottom of the tank) the tank will be sufficiently anchored in place with a topsoil layer equal to 0,7 times the tank diameter. In case of thinner topsoil or higher water table, the tank shall be anchored.
5. Lift the tank into the trench and make sure that it is horizontal and evenly supported on its base along its entire length. Make a small depression under the tank support legs to prevent the tank from resting on them.
6. Start filling the tank trench as described in the section "Filling the trench".
7. When the backfill has reached the height of the connection pipe, connect the tank to the inlet pipe and compact the earth around the pipe.
8. When the fill reaches the final height, install the lintel with or without the telescopic solution, adjusting the height as necessary.

! A tank that is installed without filling the trench to the top of the soil may shift due to groundwater. For this reason, the tank must be filled with water in the event that backfilling operations are interrupted!

Anchoring

To counteract the effects of groundwater on the tank and ensure safety, it needs to be anchored. When calculating the counterweight, take into account the maximum possible groundwater level (it is recommended to calculate the groundwater level to the surface of the ground) and the weight of the empty tank. In this case the buoyancy is equal to the volume of the tank. Anchoring can be done with concrete slabs or blocks.

Non-metallic anchor straps (nylon or similar) shall be used to anchor the tank. The straps shall withstand the environmental impact of the bottom and the buoyancy of the tank. The metal anchorage points of the concrete blocks and slabs must be corrosion resistant.



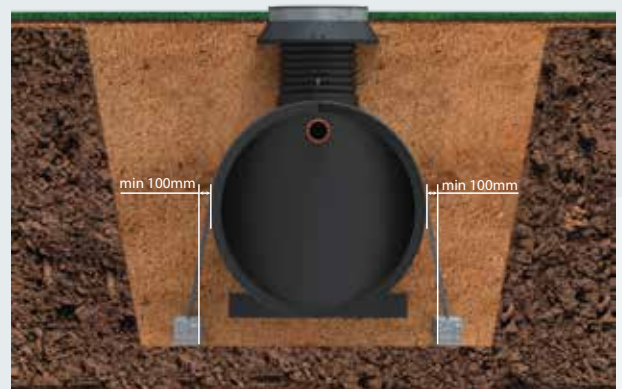
The distance between the anchor belts must not exceed 1.5 [m] and at least two belts must be used!



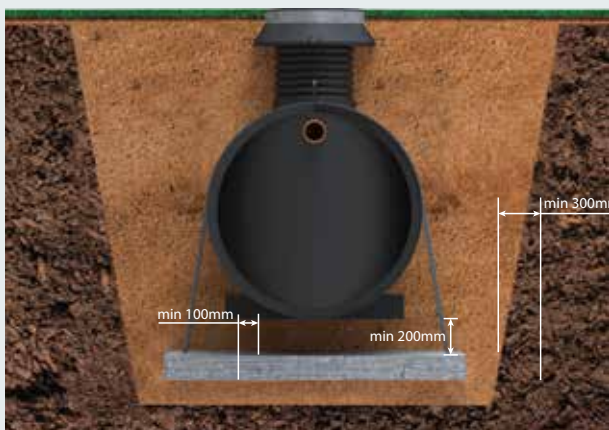
Side view

Anchoring with concrete blocks

Anchoring with blocks requires the use of at least 2 blocks outside the dimensions of the tank. The blocks must be large enough to prevent the tank from lifting. Each block must be connected to the tank at least at two anchor points.



Anchoring with concrete blocks



Anchoring with concrete slab

Anchoring with a concrete slab

When anchoring with a concrete slab, use a 200 [mm] thick reinforced concrete base. The slab is placed on a compact 300 [mm] thick pre-compacted base layer of soil with at least 95% of the standard density. If necessary due to the composition of the soil, sulphate resistant concrete can be used. The slab shall extend at least 300 [mm] beyond the sides of the tank and be at least as long as the tank. When anchoring to the concrete slab, a minimum of 200 [mm] of compacted sand shall be left between the tank and the slab.

Backfilling the trench

The trench for the tank shall be filled with 300 mm thick layers of gravel or crushed stone on all sides, compacting each layer to 95% of the natural density of the soil.

In parallel with the trench backfilling, the tank shall be filled with water to the current fill level. Special care shall be taken at the sides and ends of the tank and around pipe connections to avoid gaps.

When installing the tank in a green area, care shall be taken to ensure that the opening of the tank service shaft is at least 100 mm above the ground to prevent rainwater ingress into the tank.



In case of unstable ground or high water table, avoid using sand as backfill.

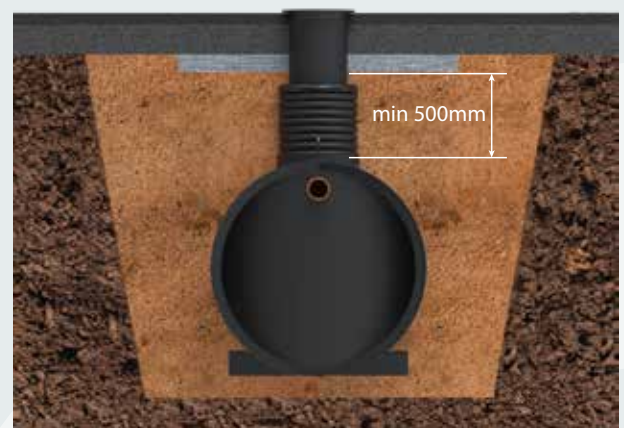


Installation under the carriageway

To avoid the impact of traffic loads on the tank installed under the carriageway, a load balancing slab shall be constructed above the tank.

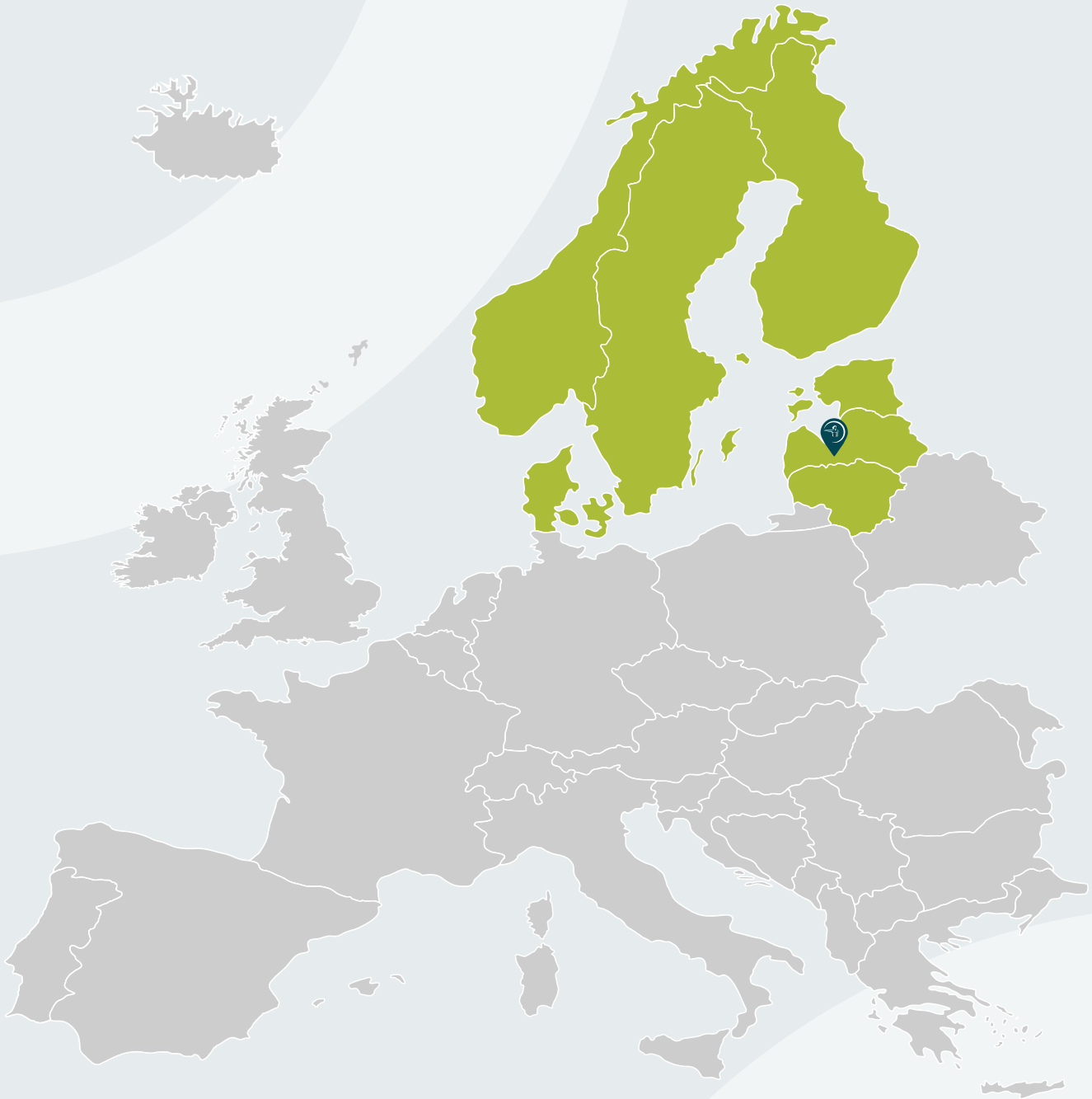
The thickness of the soil fill layer between the top of the tank and the bottom of the slab shall be at least 500 [mm]. A 150 [mm] thick reinforced concrete load-balancing slab shall be installed above the backfill layer. The slab shall be at least 300 [mm] wider than the tank in all directions.

All tanks below the carriageway shall have a cast iron cover with a telescopic pipe connecting it to the tank service shaft. This prevents the traffic load from acting on the service pit.



under the carriageway

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