



Steinzeug | Keramo

Tips for installing vitrified clay pipes



1. Unloading



Unloading with a digger

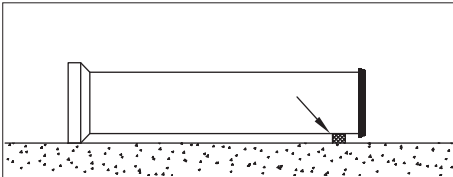
- Use two hoisting bands, no chains or loose cables.
- The hoisting bands have to be mounted around and under the packages, on the outside of the base beams.
- Guide the packages, so they won't bump against each other when being lifted.
- Don't move the packages on the lorry with a hoisting beam or a sledgehammer.
- Avoid having uncovered hoisting hooks bashing against the pipes.



Unloading with a fork-lift truck

- Place the pallet across the forks with sufficient spread between the forks and insert a protective timber between the pipe pallet and fork rear upstand.
- Always use covered forks to transport loose pipes.

2. Storage



- Put the packages on a sufficiently solid surface, so the base beams can't sink in.
- Leave sufficient space between the packages.
- When stocking loose pipes, make sure that the spigot seal does not contact the ground.

3. Check + Sound check



- Before installation, the pipes can be optically checked with talcum powder for possible cracks that can occur with mis-handling.
- Ring the pipe with a light hammer to judge the integrity.

4. Transport on the construction site



- Ideally put complete packages next to the trench.
- Don't release in the bucket of the digger or the shovel.
- Put the packages on a level surface so the pipes won't roll when the binding bands are cut.
- Take the pipe from the package just before lowering into the trench. Sling the hoisting band where the crown mark is, so the pipe will be balanced.

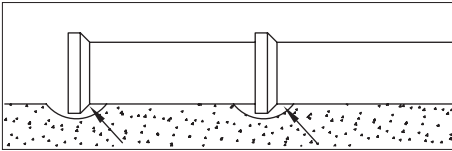
5. Installation and compression



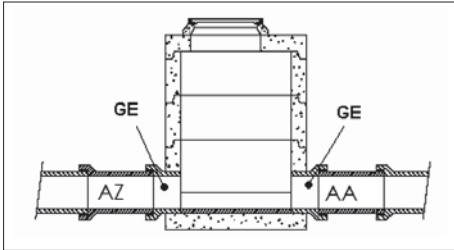
- The minimum trench width is determined in the European standard. A trench that is too narrow prevents good backfill. A trench that is too wide unnecessarily increases the construction cost. In addition, both increase the stress on the pipes.

The minimum trench width compared to the diameter

| Diameter | Minimum trench width + (P.D. = pipe diameter) |
|----------|--------------------------------------------------|
| 100-200 | P.D. + 50 cm |
| 200-400 | P.D. + 70 cm |
| 400-1000 | P.D. + 85 cm |



- Scoop out a trough of bedding to allow for joint collars ensuring the pipe is evenly supported by the full pipe barrel length.



- Short lengths of pipe should be used at points where differences in settlement might be expected, e.g. in the region of shafts or other structures.

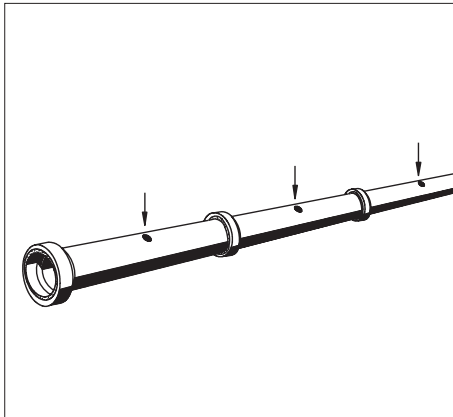
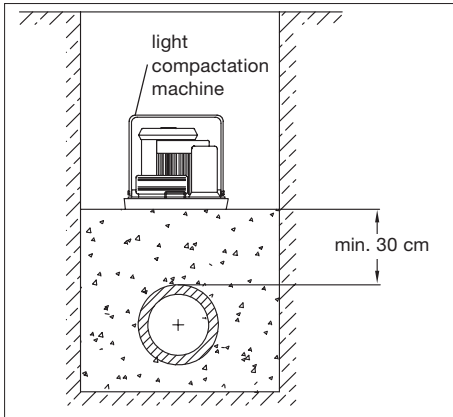


- Do not use concrete to connect pipes to an inspection chamber.

- Between the trench bottom and the side of the pipes you must keep a wide support angle of at least 90°. It's advised to use material that can be easily compacted by hand.

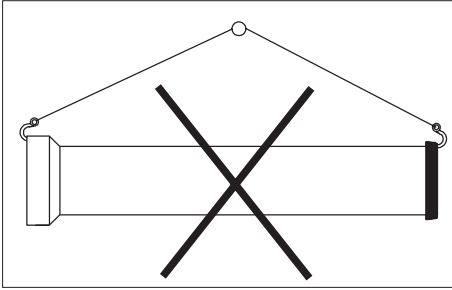
- Each backfill layer should be between 15 and 30 cm thick.

- Mechanical compaction should not be used directly above a pipe until at least 30 cm of cover above the pipe crown is in place.

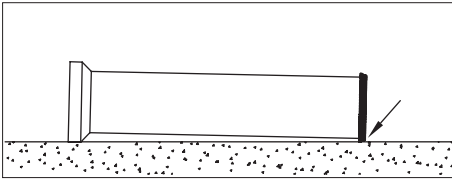


- Up to min. 30 cm above the collar it's best to use only light compaction machines.
- Avoid hard objects touching the pipe to avoid point loads.
- When installing inspection chambers, dig the trench bottom level and at the right depth.
- Ensure that the top marking (paint mark) is always facing upward. This guarantees a smooth invert. Minor deviation from the straight line will not affect the flow.
- Apply a lubricant to the spigot- and collar joints.
- Slide them into one another with a crane bucket and hoisting band.
- Always use a timber spreader when pushing pipes with a crowbar.

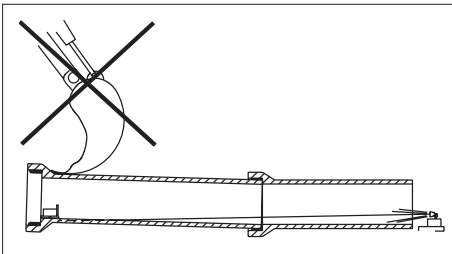
6. Current mistakes



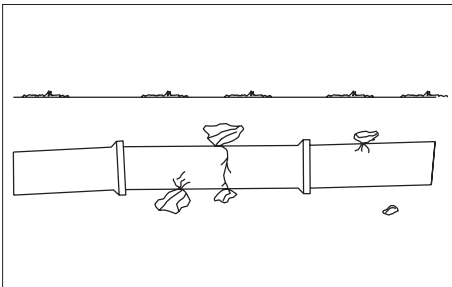
Inappropriate discharging handling equipment can damage the joints, thus causing leakages.



The spigot joints must not rest directly on the ground. Always use a piece of timber to put under the pipe.



Never correct an incorrect pipe placement by pushing on pipes using heavy equipment.



Avoid concentrated or point loads on pipes.

7. Test with water: EN 1610

Testing for leaktightness of pipelines, manholes shall be conducted either with water or with air (see pg 15) after backfilling of the trench. With a water test the pressure is equivalent to filling the section up to the ground level of the downstream or upstream manhole, as appropriate, with a minimum of 10 and a maximum of 50 kPa (0,5 bar = 5 m water column) at the top of the pipe. A conditioning time of 1 hour at the test pressure before testing should be applied. The testing time shall be 30 ± 1 minutes. Pressure shall be maintained within 1 kPa of the specified test pressure. The total amount of water added during the test to achieve this pressure requirement (W_{30}) shall be measured and recorded and not be higher than:

- 0,15 l/m² during 30 min, for pipelines
- 0,20 l/m² during 30 min. for pipelines including manholes
- 0,40 l/m² during 30 min. for manholes.

Important points observe:

- * stoppers should be adequately secured;
- * during the filling period the line should be vented.

| DN (mm) | Content l/m on base d1 | Permissible water addition in l per wetted running metre for a water consumption of 0,15 l/m ² during 30 minutes. |
|---------|------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 100 | 8 | 0,047 |
| 125 | 12 | 0,059 |
| 150 | 18 | 0,071 |
| 200 | 31 | 0,094 |
| 225 | 40 | 0,106 |
| 250 | 49 | 0,118 |
| 300 | 71 | 0,141 |
| 350 | 96 | 0,165 |
| 400 | 126 | 0,167 |
| 450 | 159 | 0,212 |
| 500 | 196 | 0,236 |
| 600 | 283 | 0,283 |
| 700 | 385 | 0,330 |
| 800 | 503 | 0,377 |
| 1000 | 785 | 0,471 |
| 1200 | 1130 | 0,565 |

Example with DN 250: length 35 m, permissible W 30, $0,118 \times 35 = 4,13$ l.

8. Air test

To be conducted after back-filling.

4 testing methods with different pressure heights P_0 are allowed. (LA, LB, LC and LD)

The testing times for pipelines, excluding manholes and permissible pressure losses Δp are given in the table in relation to pipe size.

To avoid errors following points should be taken into account:

- use suitable airtight plugs;
- an initial pressure approximately 10% in excess of the required test pressure P_0 shall first be held for 5 minutes (until DN 500) and for a time equal to DN/100 in minutes for DN > 500;
- the equipment shall allow high accuracy measurements; at least within 10% of Δp for the pressure and 5 seconds for the time;
- temperature variation influences the measurement.

| method | P ₀ mbar | Δp mbar | Testing in minutes for diameters specified | | | | | | | | | | | | | | | |
|-----------|------------------------|------------|--------------------------------------------|----------|----------|----------|----------|------------|----------|----------|------------|----------|----------|----------|-----------|-----------|-----------|-----------|
| | | | 100 | 125 | 150 | 200 | 225 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 700 | 800 | 1000 | 1200 |
| LA | 10 | 2,5 | 5 | 5 | 5 | 5 | 5,5 | 6 | 7 | 8 | 9,5 | 11 | 12 | 14,5 | 17 | 19,5 | 24 | 29 |
| LB | 50 | 10 | 4 | 4 | 4 | 4 | 4 | 5 | 5,5 | 7 | 7,5 | 8 | 9 | 11 | 13 | 15 | 18,5 | 22 |
| LC | 100 | 15 | 3 | 3 | 3 | 3 | 3 | 3,5 | 4 | 5 | 5,5 | 6 | 7 | 8 | 10 | 11 | 14 | 16 |
| LD | 200 | 15 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 2 | 2 | 2,5 | 2,5 | 3 | 3 | 4 | 5 | 5 | 6 | 8 |

The test recommended by Steinzeug | Keramo is the test LC with a test pressure of 100 mbar.

In the case of a negative result and where the cause of the fault cannot be detected unambiguously, a water pressure test must be carried out in conclusion and is then decisive for the evaluation.

It is essential that the safety regulations are maintained (No persons near to the stoppers!).



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