

**Amiblu**<sup>®</sup>  
Sustainable Water Solutions



# **HOBAS**<sup>®</sup> Installation Manual



## 1 General Information

The installation of HOBAS GRP Pipes is subject to applicable standards and guidelines such as EN 1610 and ISO/TS 10465-1.

Correct installation always requires individual calculations and comprehensive planning by certified engineers. In addition to all applicable standards and guidelines, engineers shall at all times consider all relevant conditions of the individual installation and operating situation of a certain project.

All figures and recommendations included in this manual or provided by HOBAS are basic information regarding HOBAS Pipe Systems and do not represent a commitment with respect to individual projects.

## 2 Health and Safety

Legal and local provisions as well as safety and accident prevention regulations must be observed and complied with at all times.

## 3 Support

HOBAS offers different types of customized support based on individual service agreements. For further information please feel free to contact our HOBAS Experts.

## 4 Transport

At the factory, all pipes are loaded to suit the means of transport (rail, truck, or ship). To economically transport pipes of different diameters, smaller diameter pipes may be nested inside larger ones. The loading of the pipes is performed with a forklift or crane, preferably using a coil boom. Pipes must be lifted individually with lifting slings or similar (do not use hooks!). On a level surface suitable rolls may be used as an alternative.

## 5 Storage

It is recommended to stack pipes on a level surface to evenly distribute the load. Mechanical damage and soiling of the joint surfaces must be avoided. If required, wooden beams and wedges can be used.

## 6 Buried Pipelines

The system stiffness is an important aspect of buried installations and determined by the pipe and soil stiffness. The pipeline must be carefully bedded as the soil around the pipe has a supporting function.

### 6.1 Pipe Trench

The minimum trench depth depends on the loads that are applied on the pipeline (traffic load, thrust load from bends, etc.). In any case, it is necessary to choose an installation depth below the frost line. HOBAS Specialists offer assistance in calculating the installation depth for individual applications.

The minimum trench width should be calculated according to EN 1610. Requirements of ISO/TS 10465-1 can also be used if applicable.

1. Installation of single pipe in trench according to EN 1610:

Diameter [mm]	Supported trench [m]	Unsupported trench [m]	
		$\beta > 60^\circ$	$\beta \leq 60^\circ$
$\leq 200$	de + 0.40	de + 0.40	
$> 200$ to $\leq 350$	de + 0.50	de + 0.50	de + 0.40
$> 350$ to $\leq 700$	de + 0.70	de + 0.70	de + 0.40
$> 700$ to $\leq 1200$	de + 0.85	de + 0.85	de + 0.40
$> 1200$	de + 1.00	de + 1.00	de + 0.40

For the values de + x, the minimum working space between the pipe and the trench wall or support equals  $\frac{x}{2}$ .

de ... external diameter [m]

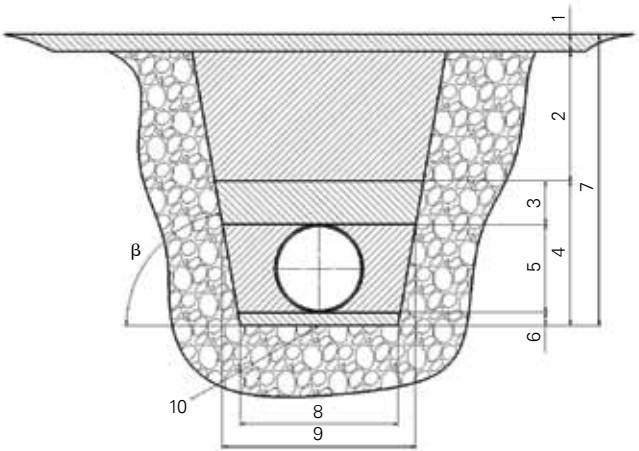
$\beta$  ... angle of unsupported trench side measured to the horizontal [°]

2. Installation of two pipes in trench; minimum trench width:

$$0.5 \text{ m} + de_1 + \frac{de_1}{2} + \frac{de_2}{2} + de_2 + 0.5 \text{ m}$$

3. Use of sheet piles during trench excavation; minimum trench width:

$$de + 2.0 \text{ m} \text{ or } 3 \times de \text{ (the larger value is applicable)}$$



- 1 Surface
- 2 Main backfill
- 3 Initial backfill
- 4 Depth of embedment
- 5 Sidefill
- 6 Pipe bedding
- 7 Trench depth
- 8 Trench width at pipe bedding
- 9 Trench width at pipe crown
- 10 Trench bottom

## 6.2 Soil Quality

Both the native soil and the bedding material must have a sufficient load-bearing capacity. If the load capacity of the excavated material is insufficient, it must be substituted by suitable bedding material (see 6.3. Trench Bottom and 6.4. Bedding and Backfilling).

Table 2: Deformation Modulus  $E_B$  (N/mm<sup>2</sup>) and Degree of Compaction  $D_{Pr}$  (%)

Soil Types (acc. to ATV 127)	$D_{Pr} = 85$	90	92	95	97	100
Group 1: Non-cohesive soil (e.g. gravel)	2	6	9	16	23	40
Group 2: Slightly cohesive soil (e.g. sand)	1.2	3	4	8	11	20
Group 3: Cohesive mixed soil (e.g. sand/clay mixture)	0.8	2	3	5	8	14
Group 4: Cohesive soil (e.g. clay)	0.6	1.5	2	4	6	10

**Table 3: Possible Cover Height (H) and Max. Allowable Initial Deformation (Def)**

	SN 2500	SN 5000	SN 10000
Soil Types (acc. to ATV 127)	H [m] Def	H [m] Def	H [m] Def
Group 1: Non-cohesive soil (e.g. gravel)	4 < 4 %	8 < 4 %	12 < 4 %
Group 2: Slightly cohesive soil (e.g. sand)	3 < 4 %	5 < 4 %	7 < 4 %
Group 3: Cohesive mixed soil (e.g. sand/clay mixture)	- -	4 < 3.4 %	6 < 3.5 %
Group 4: Cohesive soil (e.g. clay)	- -	- -	4 < 3 %

All figures shown above are non-binding examples. Each installation must be carried out on the basis of expert calculations and instructions.

## 6.3 Trench Bottom

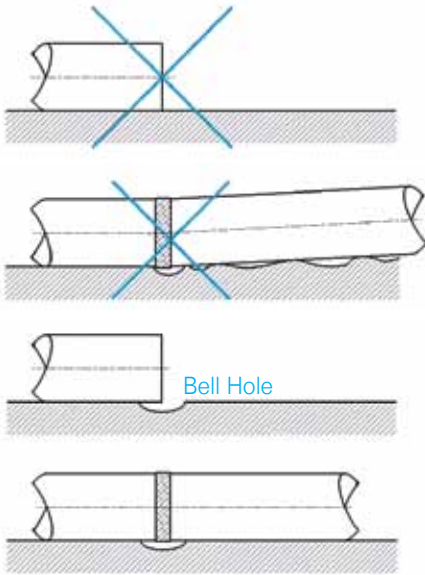
The trench bottom must be prepared in accordance with the required slope and installation depth of the pipe. The trench soil should not be loosened. If the soil is still loosened, suitable material must be added and evenly compacted. Any excavated material unsuitable for bedding the pipe and backfilling the trench should be stored separately.

## 6.4 Bedding and Backfilling

With respect to the structural analysis of the installation, special attention has to be paid to the compaction of the bedding material.

The thickness of the pipe bedding must be at least 15 cm or  $0,1 \times \text{DN}$  after compaction. With soft or unstable soils additional 15 cm of the soil should be replaced with e.g. soil type group 1 or 2. The pipe bedding must be tamped (e.g. with hand tamper or small pneumatic air tamper) and the entire length of the pipe must lie flat on the soil – with the exception of the bell holes for the couplings.

To ensure that the pipe sits flat on the base, bell holes measuring approximately three times the width of the coupling must be provided in the pipe joint area. Once the pipeline is bedded, the bell



holes must be backfilled with material of a comparable or higher degree of compaction.

The bedding serves to apply a lateral soil pressure which relieves pressure on the pipeline. The bedding material must be inserted on both sides of the pipeline and backfilled up to a height of 30 cm above the top of the pipe. The material must be compacted on both sides simultaneously in order to prevent the pipeline from being displaced in any direction. If the soil is saturated with ground water or if aquifers are present, the material used for bedding and backfilling must be free of fines.

In the sidefill and initial backfill zones the use of light vibro-tampers (max. service weight 30 kg) or light vibratory plates (max. service weight 100 kg) of an appropriate compaction depth is recommended.

The following requirements apply regarding the bedding material:

- Perfectly compactable and sufficiently load-bearing, non-cohesive material
- If the material is compacted to a proctor compaction of 92 %, the minimum rigidity must be 3 N/mm<sup>2</sup>
- Depending on the diameter range, the below listed grain sizes should be used as bedding material:
 

≤ DN 400	8-16 mm
≥ DN 500	16-32 mm



Vibro-tamper, medium

Service weight approx. 30 kg to compact the sidefill and initial backfill zone

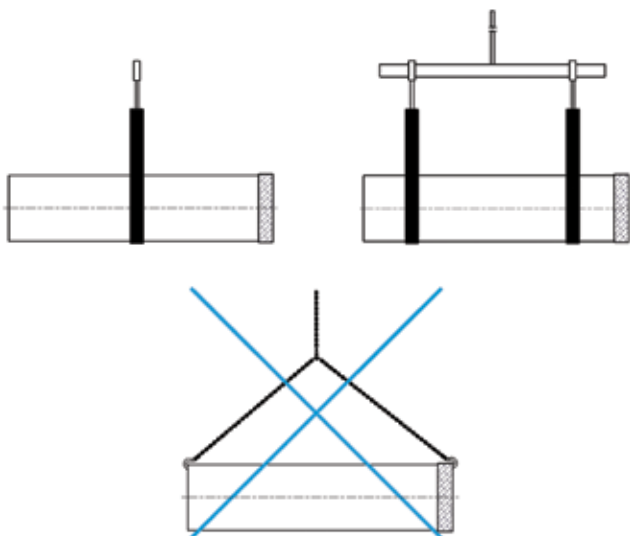
Service weight approx. 60 kg to compact the main backfill zone 0.3 m above the pipe crown

The trench shall be refilled and backfilled in 30 cm layers. Each layer has to be compacted separately. The pipes must be stable and proper compaction achieved. The removal of sheet piles may have an effect on the pipe support. Therefore, sheet piles should be removed carefully and backfilling should be closely supervised.

In the backfill zone between 0.3 and 1.0 m above the top of the main pipe the material can be compacted with a medium vibro-tamper (max. service weight 60 kg) or vibratory plate (max. service weight 500 kg). Heavy compaction equipment may be used beyond the 1 m mark above the top of the pipe. An underground warning tape should be provided. During the construction phase, major load transitions (use of e.g. heavy construction machinery or vehicles) should be avoided.

## 6.5 Pipe Handling

Depending on the conditions on site, pipes up to DN 500 can be lowered into the trench manually. If a lifting gear is necessary, we recommend the use of lifting slings. Never attach hooks or chains as pipe ends may be damaged.



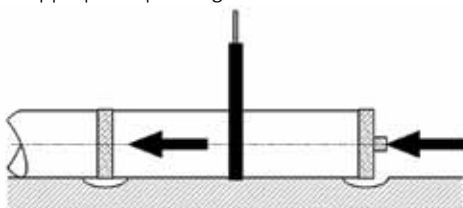
## 6.6 Pipe Jointing

The pipes are delivered with one coupling mounted onto one pipe end. All parts of the pipe – both its inner and outer surface – must be cleaned and checked before the pipes are connected. The sealing elements of the couplings must be clean. A lubricant must be applied to the pipe ends and sealing elements (use only the lubricant supplied). Depending on the pipe dimensions, there are several possibilities to join the pipes:

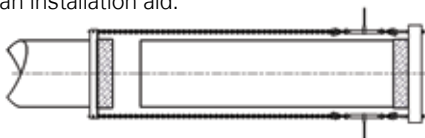
With a lever:



With an appropriate pushing force:



With an installation aid:



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Various coupling types are available to join HOBAS Pipes. HOBAS Technicians will help determine the optimal coupling.

Standard Couplings:

- FW Coupling/FWC (GRP coupling, EPDM/NBR gasket seal)
- DC Coupling (GRP coupling, EPDM gasket)

Special Couplings:

- Restrained Pressure Pipe Joints (GRP coupling, locking element, EPDM/NBR gasket seal)
- Assembly Coupling, e.g. by Straub (stainless steel coupling, EPDM/NBR gasket)
- Adapter Coupling (GRP coupling, EPDM gasket)
- Sleeve Coupling, e.g. by FlexSeal (EPDM gasket)
- Masonry Coupling (GRP coupling)

## 6.7 Curved Installation

Depending on the pipe diameter, HOBAS Couplings can accommodate the following degrees of angular deflection:

Diameter [mm]	Maximum Allowable Deflection
< 600	3°
600 to < 1000	2°
1000 to < 1900	1°
≥ 1900	0.5°

Depending on the internal pressure and the angular deflection, it may be necessary to add suitable thrust blocks (concrete supports).



## 6.8 Shored Trenches

If the trench needs to be shored, the shores must be installed step by step as the trench is filled or compacted in layers. Trench subsidence influences the build-up of load above the pipes and should be avoided. When the shoring is removed, it is important to make sure the compacted backfill material ends flush with the native soil at the trench wall.

## 6.9 Pipe Length Adjustment On Site

A circular saw can be used to cut HOBAS Pipes to length on site. After chamfering the trimmed end of the pipe, the coupling can be mounted using lubricant. No further finishing is required (no turning or similar).

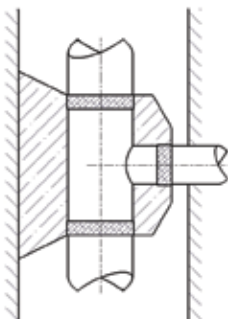
## 6.10 Installation of Fittings

Fittings are joined similarly to standard pipes (e.g. with a cable pull). If elbows with a large angle are installed, suitable installation aids may be required to properly direct the force necessary for the jointing process. HOBAS can supply such installation aids.

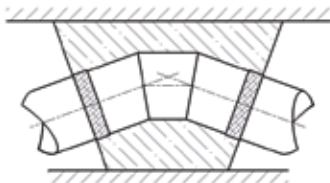
The incorporation of elbows, branches, reducers, or similar fittings produces thrust forces. The amount depends on the shape and the internal pressure. These forces must be directed into the soil by utilizing thrust blocks or suitable compaction of the backfill material. The forces can also be directed into the soil by friction between pipe and soil. Locked joints are necessary in this case.

### Thrust Blocks

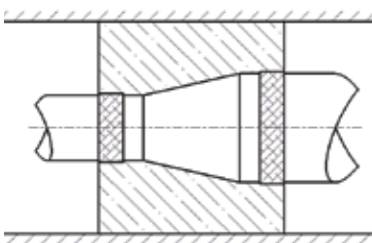
Tee:



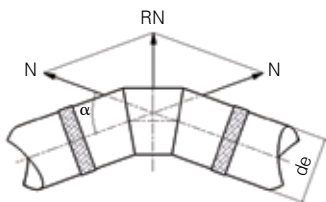
Bend:



Reducer:



Calculation of the thrust force:



$$N = \frac{P \times de^2 \times \pi}{40}$$

$$RN = N \times a$$

$$a = 2 \times \frac{\sin \alpha}{2}$$

P ... Test pressure [bar]

de ... External diameter [mm]

N ... Internal force [kN]

RN ... Resulting thrust force [kN]

a ... Factor for calculating the thrust force [-]

$\alpha$  ... Angular deflection [°]

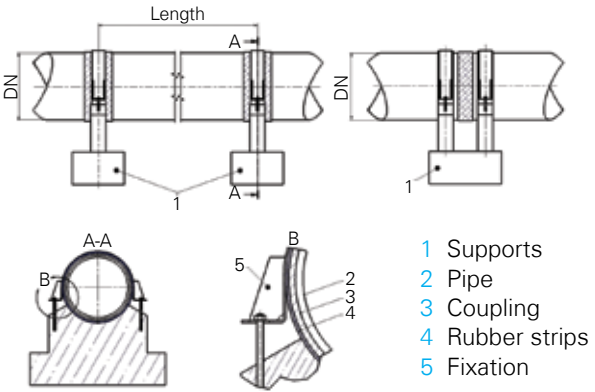
When calculating the thrust force, the test pressure of the system should be taken into consideration.

## 7 Concrete Casing

All HOBAS Pipe Types are suitable for concrete casing. The pipes shall be laid according to 6.1 to 6.10 and then secured against buoying upwards using round steel bows (at least three per 6-m pipe). Plastic putty shall be used to prevent cement slurry from entering the gap in DC couplings. Then the concrete can be cast layer by layer and has to be well compacted levelled. Do not use timber supports.

## 8 Above Ground Installation

The design of the pipeline supports should correspond to the HOBAS Recommendations. The pipe supports should be placed at a distance of maximum 3 m. In most cases, a supporting angle of 120° and a cradle width of 20 cm will suffice. When designing the supports, the longitudinal and lateral forces must be taken into consideration.



## 9 Pressure Test

A pressure test may be performed on properly bedded pipelines only. Before applying pressure, the line must be filled entirely with water. The test pressure should be max. 1.5 times the nominal pressure of the pipe or the nominal pressure + 5 bar. The lower of these two pressure values is applicable. The max. duration of the pressure test is recommended to be 1 hour. The end caps must be carefully secured so they can withstand the forces.

## 10 Other Installation Methods

HOBAS Pipes can be installed by various methods, e.g. open cut, above ground, under water, relining, and jacking. Ask our HOBAS Technicians for further information or visit the HOBAS Website.

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