



Make things happen. **HOBAS**

HOBAS NC Line



HOBAS NC Line - for Pipes with a Non-Circular Cross-Section

HOBAS NC Line are glass-reinforced polyester (GRP) pipes manufactured using the filament winding process and designed for constructing or rehabilitating non-circular sewers. An ideal solution for such applications, these special pipes can be made to fit inside the old sewer for rehabilitation or in virtually any shape required for new installations. Consisting of polyester resin, quartz sand and glass, the pipes are manufactured to DIN 16868 Part 3.

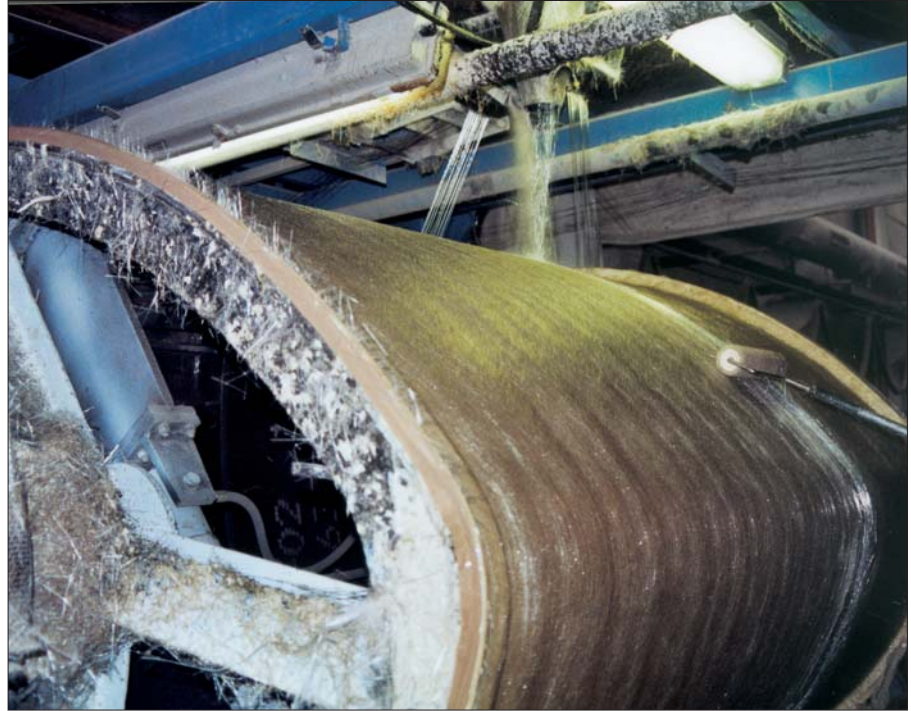


Pipe calibration template

Properties

HOBAS NC Line Pipes are manufactured on a computer-controlled filament winding machine that can produce specially shaped pipes with both circular and non-circular cross-sections up to a diameter of 2900 mm. They are made of unsaturated polyester resin to DIN 16946 Part 2, at least type 1130, quartz sand as reinforcing material of grain size <1.0 mm, and glass rovings to DIN 61855 Parts 1 and 2.

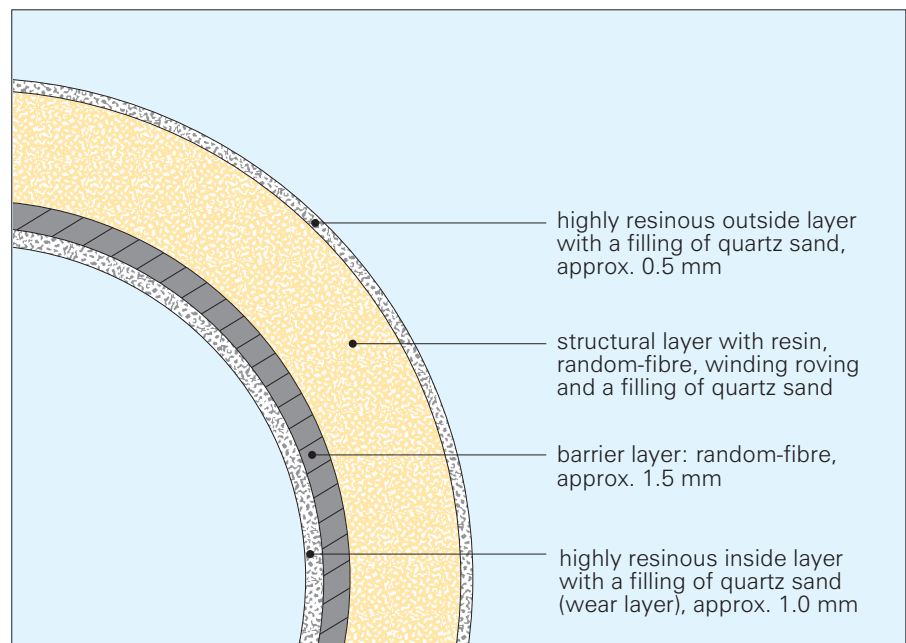
During the winding process, all the HOBAS NC Line Pipes are also fitted with a sleeve coupling at one end, which has an elastomeric sealing gasket to DIN 4060. After this process is completed, the spigot is milled. An adhesive joint is also available for special applications.



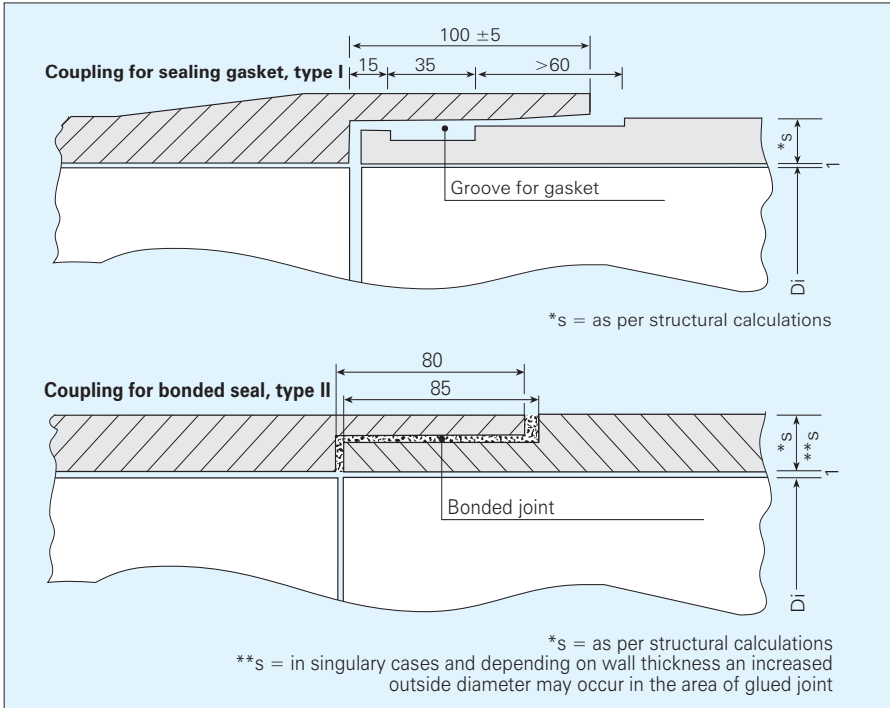
Abrasion performance was tested using the Darmstadt method and the pipes show high abrasion resistance over their entire service life.

The jetting resistance was analyzed by Siebert Engineering Consultants in Oststeinbeck (report of August 22, 1989 available on request).

Different pipe shapes and wall thicknesses can be supplied and are selected to cater for the load cases involved. Design and manufacture of the HOBAS NC Line thus meets a wide range of customer specifications.



Joins

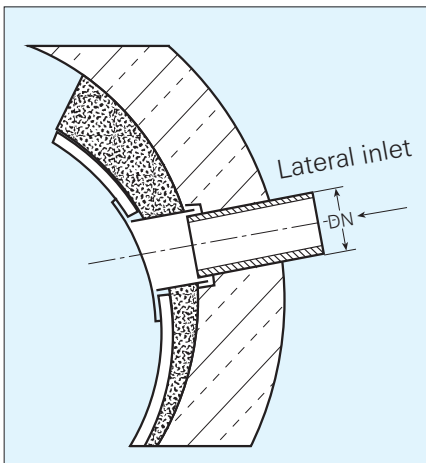


Advantages

- Custom shaped
- Various lengths
- Different joint options
- Full load-bearing capacity
- Proven jetting resistance
- High hydraulic capacity
- Certified abrasion resistance
- Rapid construction progress
- No corrosion
- Installation possible in all weathers
- Combinable with all HOBAS pipe ranges
- Convenient to work with

Structural calculations

The HOBAS NC Line Pipes are calculated taking the shape and installation conditions into account. Structural analysis takes into consideration the specifications and recommendations of the ATV code: ATV M 127 for rehabilitation and ATV A 127 for new installations. Tests are carried out by accredited third parties and building sites supervised by authorized experts or RAL quality association members.

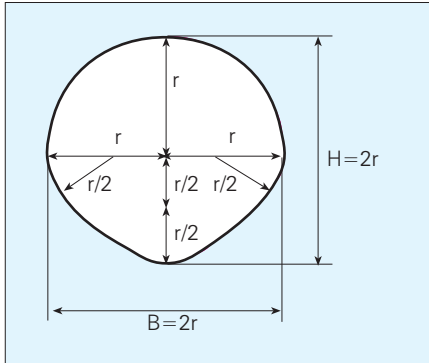


Key material characteristics

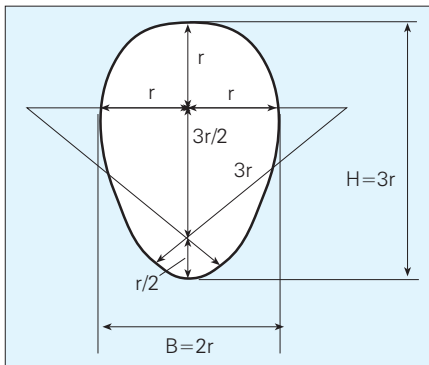
| | |
|------------------------------------|--------------------------|
| Short-term elastic modulus | 11.000 N/mm ² |
| Long-term elastic modulus | 6.875 N/mm ² |
| Short-term flexural strength | 150 N/mm ² |
| Long-term flexural strength | 94 N/mm ² |
| Abrasion after 200,000 load cycles | 0.07 mm |



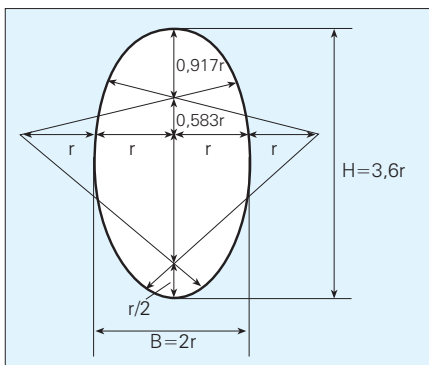
Profile forms



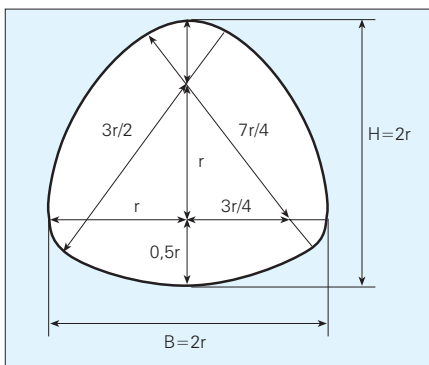
| DN | Theoretical cross section mm | A sq m | L m |
|-------|------------------------------|--------|------|
| 1,600 | 1,543 | 1.869 | 3.00 |
| 1,800 | 1,736 | 2.366 | 3.00 |



| DN | Theoretical cross section mm | A sq m | L m |
|-----------|------------------------------|--------|------|
| 300/500 | 407 | 0.130 | 2.50 |
| 400/600 | 506 | 0.184 | 2.50 |
| 500/750 | 632 | 0.287 | 2.50 |
| 600/900 | 758 | 0.414 | 2.50 |
| 680/1050 | 875 | 0.561 | 3.00 |
| 800/1200 | 1011 | 0.735 | 2.50 |
| 900/1350 | 1136 | 0.930 | 2.50 |
| 1000/1500 | 1262 | 1.148 | 2.50 |
| 1200/1800 | 1515 | 1.654 | 3.00 |
| 1406/1907 | 1666 | 2.178 | 3.00 |



| DN | Theoretical cross section mm | A sq m | L m |
|-----------|------------------------------|--------|------|
| 480/800 | 650 | 0.32 | 2.60 |
| 510/810 | 671 | 0.34 | 2.50 |
| 400/1000 | 753 | 0.43 | 2.00 |
| 750/1500 | 1182 | 1.08 | 2.50 |
| 1100/1400 | 1271 | 1.24 | 2.50 |
| 1080/1650 | 1376 | 1.42 | 2.50 |
| 1600/1800 | 1724 | 2.31 | 2.50 |



| DN | Theoretical cross section mm | A sq m | L m |
|-----------|------------------------------|--------|------|
| 1360/1570 | 1469 | 1.596 | 2.00 |
| 2680/2590 | 2618 | 5.170 | 2.30 |

Other shapes available on request.

The information and recommendations herein reflect our knowledge at the time of publication. They do not however constitute a warranty of any kind, express or implied. Details should always be checked and adjusted for individual projects, if necessary. HOBAS Rohre GmbH reserves the right to change specifications without prior notice and assumes no responsibility for errors or omissions.

Rehabilitation of an egg-shaped interceptor in Hildesheim

The first sewers were built in the north German town of Hildesheim in 1860. Given that the municipal network was designed as a combined sewer, egg-shaped pipes were the optimum solution for many sections. The interceptor requiring rehabilitation in the Langer Garten road was installed in 1906 and made of concrete with a bottom lining. An egg-shaped pipe with a cross-section of DN 800/1200, its bottom depths ranged from 4.42 m to 9.34 m. It is primarily used as a storm sewer for an industrial area, but wastewater from a paper mill is also discharged into the pipe at times.

Following sewer inspection, the damage was classified as „old pipe condition II“ to ATV M 127.

A groundwater level of 2.60 m above the bottom of the old sewer also had to be taken into consideration for the

structural dimensioning of the liner. Egg-shaped DN 680/1050 pipes with a wall thickness of 10 mm were selected for rehabilitation. They were inserted separately into the old sewer through a short shaft at the end of the relining section. After being joined, each pipe was prevented from floating at the crown of the old sewer.

The lengths of 2.0 m and 3.0 m combined with the simple jointing system enabled the liner pipes to be laid rapidly. As a result, installation was completed within six days. The storm sewers from the various properties were connected to the interceptor with laminate hand lay-up. To check leak tightness, the liner was then filled with water. Finally, the remaining annulus between the liner pipe and old sewer was completely filled with special cement (grout).



HOBAS NC Line Products DN 680/1050 for Relining stored in front of the access shaft



View into the rehabilitated sewer



Rehabilitated sewer with DN 200 laminated inlet

Berlin-Steglitz storm sewer

Intensive use and high traffic loads in the Berlin district of Steglitz-Lichterfelde Ost resulted in deterioration of a concrete storm-water sewer (hood cross-section 1560x1770 mm). In view of the damage detected and the load conditions, the HOBAS NC Line Pipes were calculated on the basis of „old pipe condition II“ to ATV M 127 Part 2. They were then manufactured using a calibration template that was a replica of the old pipe shape. Two-meter lengths were laid in the straight sections of the sewer and one-meter lengths in the curved sections.



HOBAS NC Line pipe installation

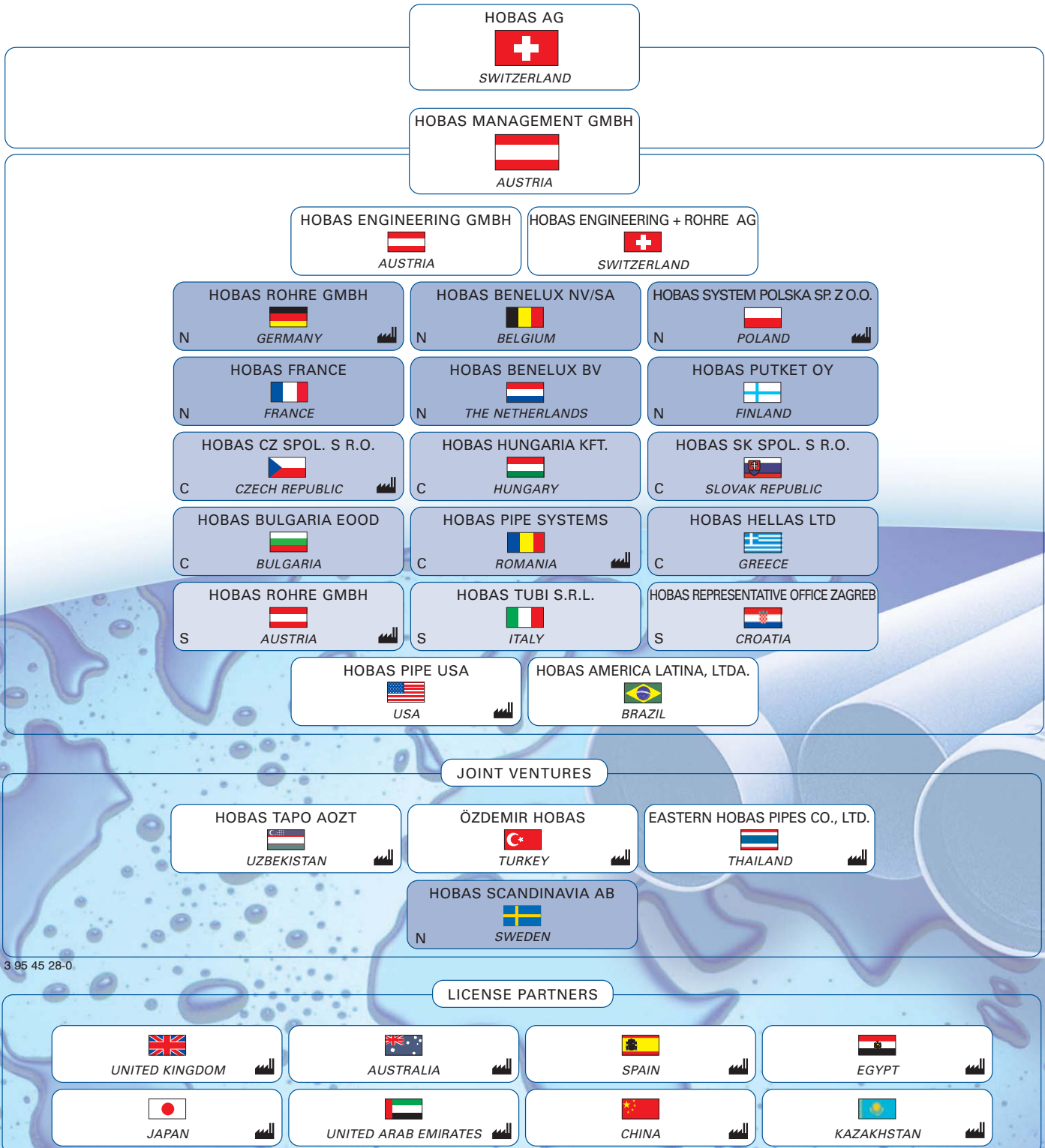
The HOBAS pipes were joined with push-on couplings bonded in place by laminate hand lay-up. Precautions were also taken during installation to prevent flotation. After tightness testing to DIN EN 1610 procedure „W“, grout was injected section by section.


Project Sheet - HOBAS NC Line

| | | | | | | | |
|--|--|------------------------|--|----------------|---------------------------|-----------------|--|
| Project | | | | | | | |
| Site | | ADM | | | Date | | |
| 1. Existing sewer | | | | | | | |
| Shape | | | | | | | |
| Round | | Egg | | Oval | | Square | |
| Trapezium | | U-shaped | | Rectangular | | Other | |
| Sketch | | | | | | | |
| | | | | | | | |
| Length | | | | | | | |
| Total | | | | | | | |
| Sections | | | | | | | |
| Size | | | | | | | |
| Diameter or b x h | | | | | | | |
| Size in mm | | | | | | | |
| Wall thickness | | | | | | | |
| Material | | | | | | | |
| Concrete | | Brick | | Steel | | Asbestos cement | |
| Cast iron | | Earthenware | | Vitrified clay | | Other | |
| Damage description | | | | | | | |
| Old pipe condition to ATV M 127 | | I | | II | | III | |
| Leaks at joint | | | | | | | |
| Open cracks | | Longitudinal direction | | | Circumferential direction | | |
| Hair cracks | | Longitudinal direction | | | Circumferential direction | | |
| Collapse | | Partial | | | Complete | | |
| Differences in height | | Differences in widths | | | | | |
| Roots | | Incrustations | | | Infiltration | | |
| Exfiltration | | Chemical attack | | | Abrasion | | |

| 2. Operating conditions | | | | | | | |
|----------------------------------|---------------------------------|------------------------|----------------------|---------------------------|---------------------|------------------------|--|
| Type of sewages | | | | | | | |
| Domestic | | Rain water | | Storm water | | Mixed | |
| Industrial wastewater | | | | | | | |
| Loads | | | | | | | |
| Max cover depth | | | | Min cover depth | | | |
| Traffic load | | | | | | | |
| Max. traffic load in n/mm^2 | | | | | | | |
| Groundwater | | Depth above pipe crown | Min depth | | | Max depth | |
| Hydraulic conditions | | | | | | | |
| Gradient (in mm/m or %) | | | | New gradient, if required | | | |
| Required flow rate (m^3/sec) | | | | | | | |
| Soil conditions | | | | | | | |
| Native: | soil group | | | Compaction | | | |
| Alternative: | deflection modulus (N/mm^2) | | | Cavities | | | |
| Acces | | | | | | | |
| Shaft diameter | | | | Min manhole DN | | | |
| Required rehabilitaton | | | | | | | |
| One-part sections | | | Several-part section | | | Inserts (e.g. channel) | |
| Wall thickness | | | | | | | |
| Length of sections | | | | Straigth | Curve | | |
| Type of joint | | | | Bell | with/without gasket | | |
| | | | | Tongue and groove | with/without gasket | | |
| Mechanical properties | | | | | | | |
| Elastic modulus | Short-term | | | | Long-term | | |
| Grouting | | | | | | | |
| Properties | Density [kN/m^3] | | | | Filling depth | | |
| Components | | | | | | | |
| Hydraulic calculation | | | | | | | |
| Ks | | | | | | | |
| Flow capacity | | | | | | | |
| Shipping requirements | | | | | | | |
| Notes | | | | | | | |
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HOBAS Worldwide



N = HOBAS North C = HOBAS Central S = HOBAS South  Production Facility