Installation Instructions

1. SCOPE

The following instructions apply for utilization and installation of KG2000 pipes and fittings made of polypropylene (PP), colour spring green RAL 6017, which serve as non-pressure underground pipes for the drainage of waste water according to DIN 1986-3.

For the production of waste water piping systems, the recommendations under DIN 1986-1, DIN 1986-4 and DIN EN 1610 apply.

2. AREA OF APPLICATION

KG 2000 polypropylene waste water pipes and fittings are suitable for the use as underground pipes, sewer connections and sewer pipes for the drainage of waste water in accordance with DIN 1986-3. In special cases the chemical resistance can be seen in the DIN 8078 supplementary sheet no. 1.

KG 2000 pipes and fittings can be used as:
a) Ground pipes
b) Connection sewers

as well as in heavy duty areas (SLW 60) with a minimum covering of 0.8m, with a maximum covering of 6 m and in ground water regions.

3. TRANSPORTING AND STORING KG 2000 PIPES AND FITTINGS

The pipes and fittings are to be protected against damage. The pipes should be supported over their entire length during transport in order to avoid sagging. Impact stress – especially under freezing temperatures – must be avoided.

Pipes and fittings may be stored outdoors. The following measures must be observed on storing pipes:

a) Pipes must be stored in such a manner that perfect support is ensured and no deformations can occur.
b) The pipe layers can be stored both with and without wood in between them.
c) On storing, the pipe sockets should be horizontally and vertically unhampered.
d) A stacking height of 2 meters should not be exceeded.

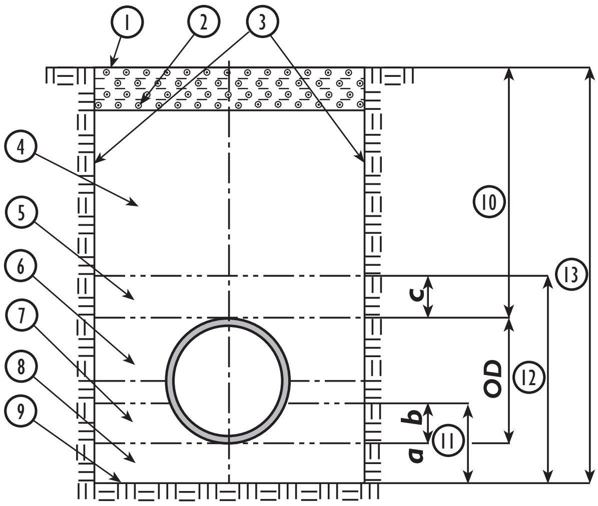
Rubber sealing elements, if not protected, should not be stored outside for long periods.

4. SUPPORT AND EMBEDDING

Pipes can be laid in consistent, relatively loose, fine-grained soil if a support along the entire length is possible. At the sockets, hollows are to be made in the lower embedding area so that the connection can be properly carried out. The hollows may not be larger than necessary in order to carry out proper connections.

Should the soil in question not be suitable as a support, the ditch bed must be dug deeper and a support made. The thickness of the lower embedding layer may not exceed the following:

a) 100 mm in the case of normal soil
b) 150 mm in the case of stones or compact soil



1 Surface
2 Lower edge of the road or rail structure, if present
3 Ditch walls
4 Main filling (3.6)
5 Cover (3.5)
6 Side filling (3.12)
7 Upper bedding layer
8 Lower bedding layer
9 Ditch bed
10 Cover height
11 Thickness of embedding
12 Thickness of the piping area
13 Ditch depth
a Thickness of the lower bedding layer
b Thickness of the upper bedding layer
c Thickness of the cover

The thickness of the upper embedding layer should be carried out in such a manner that structural analysis conditions are fulfilled and a support angle of 180° is achieved, i.e. generally 0.5 x DA. Should the bed of the ditch prove to not have sufficient supporting properties, special measures are required. Should, due to the construction, a concrete slab be necessary in the area on which the pipes rest, it is recommended that provision is made for an intermediate layer of suitable soil between the pipe and slab. This layer should be 150 mm under the pipe shaft and 100 mm under the connection.
Should, for structural reasons, additional steps for instalment be considered essential, a concrete slab above the covering area is recommended instead of a concrete jacket for load distribution purposes. Should a concrete jacket be planned, it is to be produced in such a manner that the entire structural load can be absorbed by the jacket.

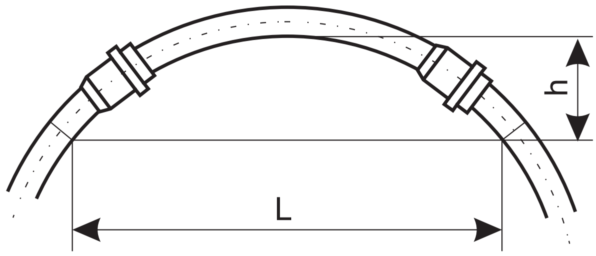
5. EMBEDDING IN CONCRETE

Polypropylene pipes and fittings may be directly embedded in concrete. However, the following instructions must be observed:

a) Cover the socket gap with adhesive tape so that no concrete grout can seep in, which may then hinder the subsequent functioning of the push-fit socket.
b) Protect the pipes against uplifting. The intervals between the mounting points must ensure that no excessive sagging can occur (formation of water traps).
c) Thermal changes in length, both on installation and in subsequent operation, must be taken into consideration.

6. INSTALLATION PROCEDURE

Prior to installation, KG 2000 pipes and fittings must be checked for any damage. Each pipe and fitting is to be levelled according to gradient and direction. A straight, continuous path in the stipulated gradient is to be observed. In special instances, the DN 110 to DIN 315 pipe routing can be installed as indicated in the following diagram. However, the data indicated in the following table may not be exceeded.



(Bending of pipes > DN 200 is practically impossible in view of their greater intrinsic rigidity)

Gauges h max. or bending radii in meters at a length L:

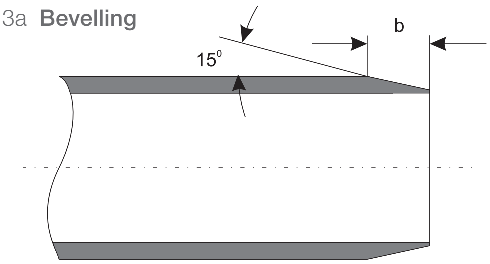
	h			
DN	110	125	160	200
8	0,24	0,21	0,17	0,13
12	0,54	0,48	0,38	0,30
16	0,97	0,85	0,67	0,53
R [m]	33	38	47	61

7. CUTTING TO LENGTH AND BEVELLING

If necessary, pipes may be cut to length with a suitable plastic cutter or fine-toothed saw. Cuts are to be made at right angles to the pipe axis. A guiding frame may be useful.

Fig. 3 **Cutting to length with a frame**

Fig. 3a **Bevelling**



Fittings may not be shortened as otherwise their seal tightness property suffers.

DN	110	125	160	200	250	315
b mm ca.	6	6	7	9	9	12

The cutting edges must be trimmed. The pipe ends must be bevelled at an angle of approx. 15°, as in the illustration, using either a suitable tool for bevelling or a coarse file.

8. SETTING UP THE CONNECTION AT PIPES AND FITTINGS

a) Remove any dirt from the inserting end (spigot end) and sockets and, if necessary, from the sealing element.
b) Check the position of the sealing elements and make sure they are in perfect condition.
c) Coat the bevelling of the inserting end evenly with a lubricant. Do not use any oil or grease!
d) Push the inserting end into the socket until it resists and make a marking on the edge of the socket with a pencil or a felt-tip pen. Finally the pipe end must be pulled approx. 3 mm per metre of installed total length. It must, however, be pulled out at least 10 mm. The installation of couplers and double sockets is carried out in the same manner.

9. CONNECTION TO CONSTRUCTIONS

Connections to constructions (chambers etc.) are to be carried out with joints using chamber inner linings (KGF). Sealing between the chamber inner lining and the sewer pipe is carried out by means of the rubber sealing ring.

10. FILLING AND SEALING

Either earth at the location or material delivered can be used as material for the piping area as long as neither the pipe material nor the ground water are affected. A suitable bedding material is layered, grainy loose soil with a maximum granule size of <22 mm or alternately crushed construction materials with a maximum granule size of 11 mm. Hydraulically combined construction materials such as stabilised soil, light concrete, lean-mixed concrete, non-reinforced concrete are suitable.

During the procedure of filling and sealing in the region of pipes up to 30 cm above the pipe shaft, particular care must be taken that
a) Pipes are not brought out of alignment or position. Sand cones or other accessories may be of assistance.
b) By means of layering suitable soil and intensive compressing up to and above the recommended height, it is ensured that no hollows form under the pipes and the supporting angle stipulated in the structural analysis is achieved.

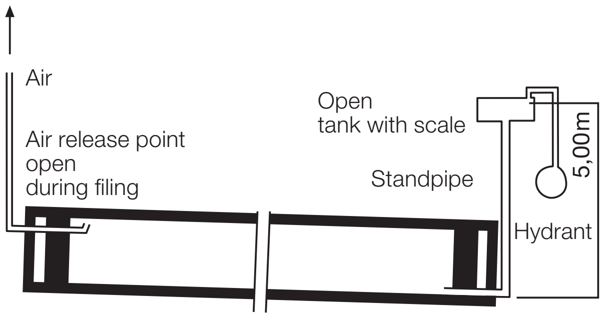
Compression and the material fed in contribute directly to stability. Each layer is to be compressed either manually or with the help of light machines. Finally the remaining main filling is to be carried out in accordance with planning and instructions, in order to avoid surface subsidence.

11. WATERTIGHT TEST

Checking to see that piping, shafts and inspection openings are watertight is either to be carried out with air (procedure "L") or with water (procedure "W"). In the case of procedure "L" the number of corrective measures and repeated checks in the case of failure is unlimited. In the case of a single or repeated failure to pass the test with air, moving on to testing with water is permissible. The result of the test with water is then decisive.

TESTING WITH WATER

All openings of the section of piping to be checked as well as branches and junctions are to be closed in a watertight manner and secured against pressure and being pressed out. It is recommended – particularly in the region of the property – that the large number of fittings be anchored by means of driving in posts or by means of anchoring them with appropriate locking clamps so that any changes in position are avoided. In straight pipelines, too, pipes and inspection stoppers are to be supported accordingly against horizontal pressure. The piping, should it not have been covered, is to be secured against changes in position. The piping is to be filled with water in such a manner that it is free of air. Therefore it makes sense to fill the pipes slowly from the lowest point so that the air present in the pipes can escape from the sufficiently-large air release points at the highest point of the piping.



Sufficient time (one hour) is to be provided between filling and checking the piping in order to allow any air flowing into the pipes on filling and remaining there to gradually escape. The test pressure is to be taken at the lowest point in the part to be checked. Non-pressure pipes are to be checked with 0.5 bar excess pressure. The test pressure, which must have been achieved prior to testing, has to be maintained for 30 minutes in accordance with DIN EN 1610. If necessary, the quantity of water required is to be constantly filled and gauged.

The test requirements have been fulfilled when the volume of water added in 30 minutes is not more than 0.15 l/m² for pipes.
Please note: m² describes the moistened inner surface.

TESTING WITH AIR

General: The alternative air pressure test, due to its many advantages over the water pressure test, is the more popular procedure.
Testing with air (testing procedure “L”): Recommendations for testing time for piping (without shafts and inspection openings) can be seen on the following table, taking into consideration the respective pipe diameters.
The procedure should be stipulated by the client. For reasons of safety, careful handling and testing are emphasised. Attention must be paid to tight fittings of the shutoff elements!

Test procedure	P_0*) (mbar)	Δp (kPa)	DN 110	DN 125	DN 150
LC	300 (5)	50 (30)	3	3	3
Kp-value			0,06	0,06	0,06

Test procedure	P_0*) (mbar)	Δp (kPa)	DN 200	DN 250	DN 315
LC	300 (5)	50 (30)	3	3,5	4
Kp-value			0,06	0,06	0,06

*) Pressure above atmospheric pressure