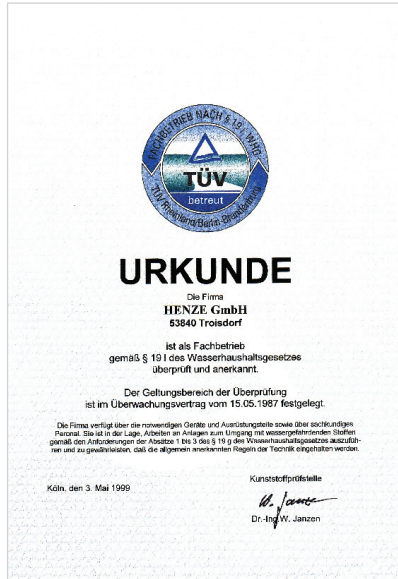




Planning





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Character traits of the pipe system	4
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Customer and Project support

We consider it an important aspect of our work to support our customers with our experience, know-how and engineering services. Therefore we do not only sell pipe to our customers. We in fact develop concepts together with our customers, exchange experiences and work flexibly – this is how our customers benefit from our production flexibility: With us customers have short information routes, personal contact and flexible solutions.

In the beginning of a project we supply information and tender specifications for planners. Throughout the project we stand by accompanying individual requirements and problems in order to assure our company quality.

Information for planners

The cooperation with Henze starts long before manufacturing the pipe. We provide the planners with extensive HENZE-information materials, in order to give them the required technical basis for their planning calculations.

Requirements for pipe systems

Modern drainage pipes are facing increasing challenges. They have to withstand weights, which will effect them during use, they need to be chemically resistant against very aggressive sewage and they need to be abrasion resistant, as the sewage always carries sand, stone chips and other abrasive materials along with it.

A guaranteed leak free sewage system is the best protection against polluting the soil and ground water. Welding pipes assure permanent leak free characteristics. Today's PE-pipes have a proven life span of 100 years.

Material Choice

Henze wound pipes are made out of polyethylene and polypropylene. They belong to the group of flexible pipes and carry the surface weight by using support of the surrounding soil.



Polyethylen

Polyethylene is a partially crystalline thermoplastic. By changing the polymerisation processes PE-types with different characteristics can be developed.

PE is highly resistant against chemicals. In comparison to other plastics it maintains its form and high viscosity even during temperatures far below 0° C.

It is also usable for temperatures up to 60° C. The high density and crystallinity of PE increases tensile strength and tensile stiffness. We use Polyethylene – High Density (grade PE 80 and PE 100 3rd generation) in order to manufacture spirally wound pipe. They are unique for their bimodal molmasses distribution.

Most important character traits:

- ⚙️ Long life span / durability
- ⚙️ Strong resistance against slow tare growth and tare expanse.

Polypropylen

Polypropylene is a thermoplastic plastic material. Please differentiate between PP-H, PP-R and PP-B. The Copolymerisates PP-B and PP-H have tougher traits especially in colder temperatures. In hotter temperatures they have though a lower stiffness. As HDPE, PP is resistant against aqueous / watery acids, leach, and salts as well as a larger number of organic solvents. It can be used for higher temperatures (up to 95°C). For production of wound pipe we usually use PP-H. Even under hotter temperature the stiffness remains high. PP pipes must be protected against permanent sun rays, as the pipes are not UV-stabilized. If placed in the ground no further protection is needed.

Ecology and Environment

Polyethylene and Polypropylene are pure organic materials. Environmentally they are considered as completely neutral. They are easily recyclable, can be melted and reused almost an unlimited amount of times. Non reusable material can be used ie to produce energy. Only water and carbon dioxide result from burning. Five grams of Polyethylene contain enough energy to provide a 60 watt lamp with electricity for one hour.

Qualities of the Pipe System

Along with HENZE technology advanced products are developed:

Hydraulic Qualities

A Low abrasion coefficient in connection with the smooth surface guarantee good flow characteristics. Furthermore the antiadhesive surface reduces sediments in the pipe.

Low Weight

Naturally Plastic Pipes weigh little in comparison to other pipe materials. HENZE technology further decreases the weight by spiral pipe winding technology. This maintains the necessary pipe stiffness. Bend elastic traits further divert loads to the surrounding soil and make the pipe suitable for highest pressures. |

Leak free system

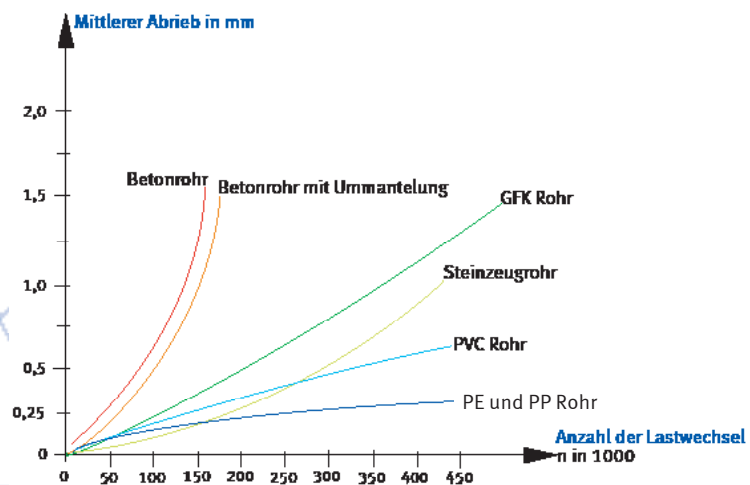
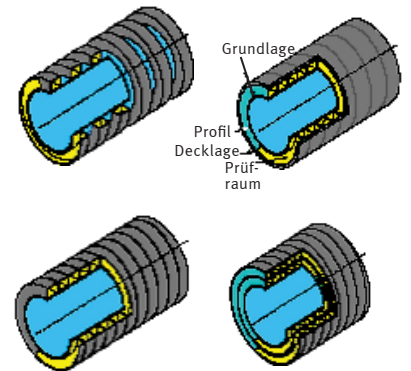
The good weldability of the material guarantees a permanent leak free pipe system. Root growth into the pipe does not take place.

High Abrasion Resistance

The utilised materials have a high abrasion resistance, which was proven i.e. in the Darmstadt tests.

Qualities of the Pipe system

The spiral wound pipes were developed for pressure free Pipelines. Because of the special wall structure pipes with high stiffness can be manufactured, which can carry very large loads, even though the pipe maintains its light weight. The system consists of pipes, manholes, premolded parts and a number of functional gadgets. The pipes can be used in new structures, but also in repairing damaged ones. The pipes are produced in sizes ID 400 to ID 3600 out of Plastic HDPE, PP and PVDF.



Hydraulic Measurement

For the hydraulic measurements of HDPE profile wound pipe we advised using ATV-DVWK-A 110 regulations, which describe Hydraulic dimensioning and performance of sewage systems and pipes”.

In calculations one needs to differentiate between hydraulic wall roughness k and the operational roughness k_b .

For the operational roughness following variables are taken into consideration:

- ⌘ Wall roughness ($K=0.1\text{mm}$)
- ⌘ Storage changes and inaccuracies
- ⌘ Number of pipes
- ⌘ Supply parts
- ⌘ Shaft structure

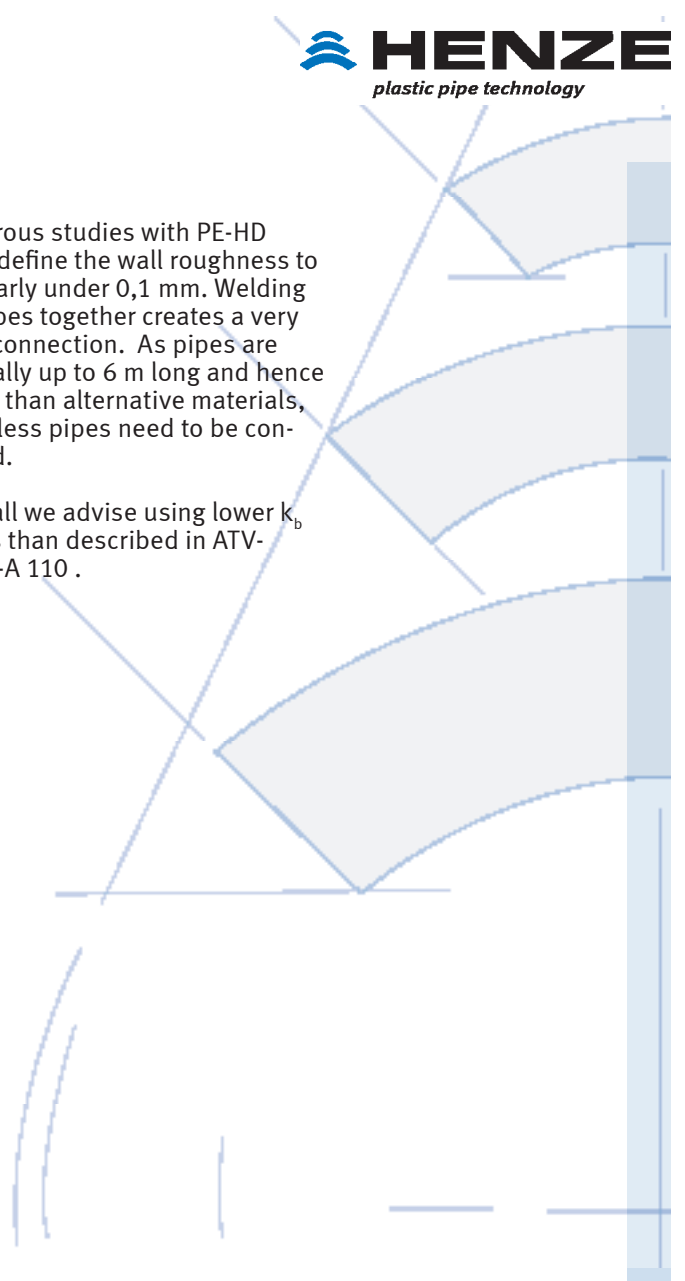
The Prandtl-Colebrook formula determines the pipe diameter according to hydraulic aspects, drainage quantity and pipe gradient.

$$Q = \frac{\pi \cdot d^2}{4} \cdot \left[-2 \lg \left(\frac{2,51 \cdot \nu}{d \cdot \sqrt{2g \cdot d \cdot J_E}} + \frac{k_b}{3,71 \cdot d} \right) \right] \cdot \sqrt{2g \cdot d \cdot J_E}$$

- $d[\text{mm}]$ Pipe circle diameter (light distance)
- $\nu [\text{m}^2/\text{s}]$ Kinetic viscosity
- $k_b[\text{mm}]$ Operational roughness
- $J_E [1]$ Energy line gradient
- $g [\text{m}/\text{s}^2]$ Soil acceleration

Numerous studies with PE-HD Pipes define the wall roughness to be clearly under 0,1 mm. Welding the pipes together creates a very good connection. As pipes are generally up to 6 m long and hence longer than alternative materials, much less pipes need to be connected.

All in all we advise using lower k_b values than described in ATV-DVWK-A 110 .



RECOMMENDATION FOR PE-HD PROFILE SPIRAL PIPES	TYPE OF CANALS	STANDARD SHAFTS	FORMED SHAFTS	SPECIAL SHAFTS
0,25 bis 0,4 ¹⁾	Transportation canals	0,5	0,5	0,75
0,25 bis 0,75 ¹⁾	Collection Canals ≤ DN1000	0,75	0,75	1,5
0,25 bis 0,75 ¹⁾	Collection Canals <DN1000	-	0,75	1,5
0,1	Flow Control Stretch, Pressure Pipelines, Düker, Reliningstretches without shafts	0,25	0,25	0,25

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Static Calculations

In order to do the correct calculations it is necessary to develop an exact description of the installation and load circumstances. We will determine a project based wall thickness, which will guarantee an optimal dimensioned pipe system.

Henze offers static calculations for buried pipes. Please fill in the questionnaires and send them to our technical service department. The questionnaire contains all the necessary data for these calculations.

Static Calculations of Buried Pipelines

The calculation is according to ATV-DVWK-A 127.

Statistic Calculations of Shaft Structures

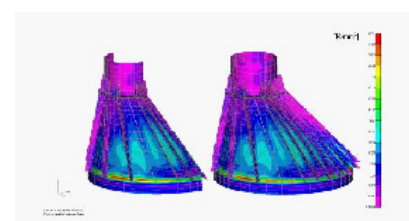
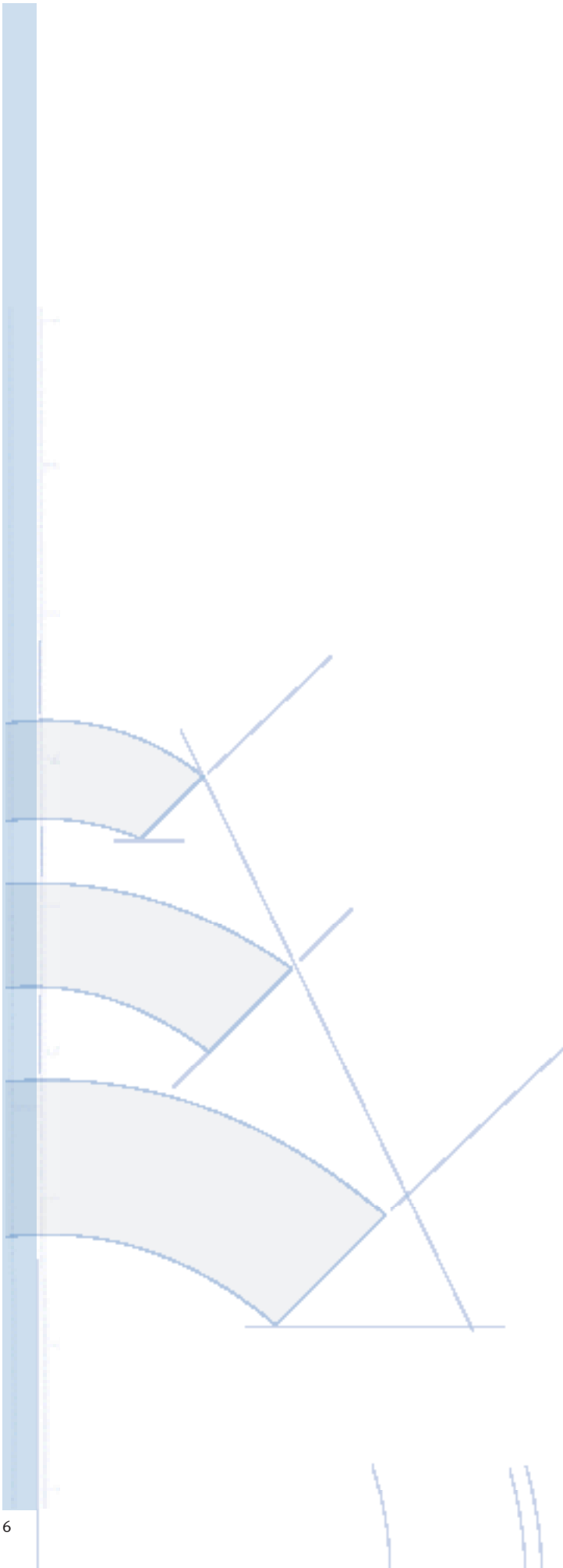
The static calculation of buried shafts and structures is according to ATV-DVWK-A 127. Different floor and cover boards are taken into consideration.

Static Calculation for Repair through Short or Long Pipe Process

The static calculations for buildings and operational conditions are according to ATV-M 127-2. The measurements can be according to the old pipe condition I and II.

Static Calculation of Special Cases

For difficult marginal notes and for special constructions, which are not covered by the ATV-DVWK guidelines, we use the calculations according to the finite-element-method.



Questionnaire for the Static Calculation of Pipelines in an Open Construction

PROJECT _____

INSTALLATION SITE _____

DIAMETER OF THE PIPE ID _____ PIPE MATERIAL _____

Covering up E1

Soil Groupe according to ATV DVWK A 127

Altitude of the covering up h _____ mm

SOIL GROUP COVERING UP

Non cohesive

<input type="checkbox"/>	G1
--------------------------	----

Weak cohesion

<input type="checkbox"/>	G2
--------------------------	----

Cohesive Soil mixture

<input type="checkbox"/>	G3
--------------------------	----

Cohesive Soil

<input type="checkbox"/>	G4
--------------------------	----

Degree of compression Dpr _____ %

Or deformation modulus _____ N/mm²

Piping Zone E2

Soil Groupe Rule

<input type="checkbox"/>	G1
--------------------------	----

Degree of Compression Dpr _____ %

SOIL GROUPE

Weak cohesion

<input type="checkbox"/>	G2
--------------------------	----

Cohesive Soil mixture

<input type="checkbox"/>	G3
--------------------------	----

Cohesive Soil

<input type="checkbox"/>	G4
--------------------------	----

Degree of Compression Dpr _____ %

Adjacent Soil E3

Soil Groupe according to ATV DVWK A 127

Non cohesive

<input type="checkbox"/>	G1
--------------------------	----

Weak Cohesion

<input type="checkbox"/>	G2
--------------------------	----

Cohesive Soil Mixture

<input type="checkbox"/>	G3
--------------------------	----

Cohesive Soil

<input type="checkbox"/>	G4
--------------------------	----

Rock

<input type="checkbox"/>	
--------------------------	--

Degree of compression Dpr _____ %

Specific Gravity of soil _____ KN/m³

E-Modul _____ N/mm²

SENDER _____

Datum _____ Stempel _____ Unterschrift _____

Load

NO TRAFFIC

TRUCK 12

SLW 30

SLW 60

TRAIN

PLANE

Water Table above Pipe sole _____ mm

Operational Condition

Circulation Medium: _____ Water

Temperature of Medium _____ °C

Operational Pressure _____ bar

Testing Pressure _____ bar

Installation/Construction

PIPE DITCH/BUILDING GROUPE SLOPED

Degree of Slope:

45°

60°

90°

PIPE DITCH/BUILDING GROUPE WITH SHEETING

Horizontal Sheeting

Perpendiculat Canal Sheets

Perpendicular Wood Sheets

Sheeting Plates

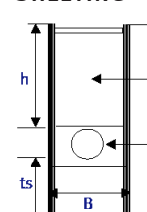
Perpendicular Bung Profile

Clamp-Deep ts _____ mm

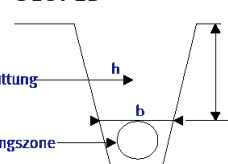
Dam Filling

Pipe Ditch width b _____ mm

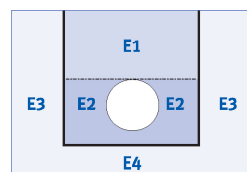
PIPE DITCH WITH SHEETING



PIPE DITCH SLOPED



EXPLANATION OF SOIL TYPE



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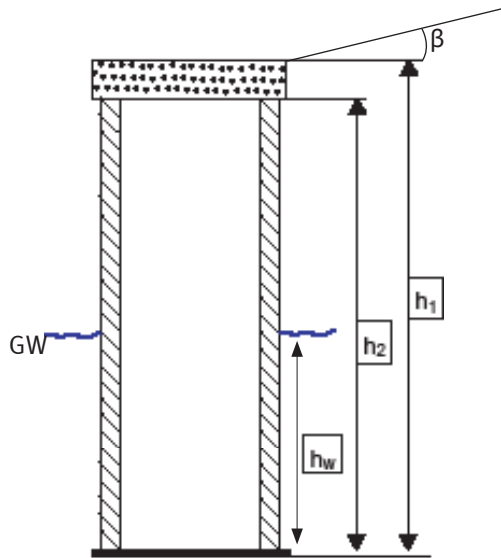
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PROJECT _____

BUILDING SITE _____



Installation

- Shaft diameter DN _____ mm
- Installation depth (h_1) _____ mm
- Length of shaft pipe (h_2) _____ mm
- Ground water level (H_w) _____ mm
- Angle of slope (β) _____ degree
- Wichte of earth (γ) _____ KN/m³

SENDER _____

Datum _____ Stempel _____ Unterschrift _____

Adjacent Ground

Soil Groupe	G1	G2	G3	G4
Proctor Density in %				
or known E-Modul N/mm ²				

Operational Conditions

Operational Temperature _____ °C

Circulation Medium _____

Bedding

STANDARD CASE **BODENGRUPPE G1**
 Proctor Density in % _____
 or known E-Modul _____ N/mm²

SPECIAL CASE **SOIL GROUPE G2**
 Proctor Density in % _____
 or known E-Modul _____ N/mm²

Traffic Load next to Shaft

- No Traffic
- TRUCKs 12
- SLW 30
- SLW 60
- Train one track
- Train multiple tracks

Traffic Load (Free Input) _____ N/mm²

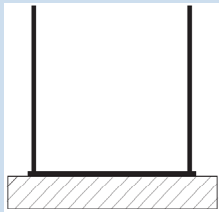
Traffic Load on the Cover

- Cover Building Structure Nr. _____
- TRUCKs 12
- SLW 30
- SLW 60

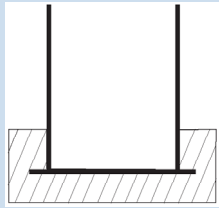
Shaft Ground Form Nr. _____

Shaft Floors and -Lid Format

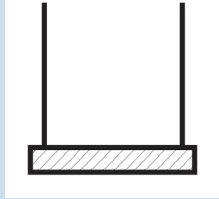
Shaft Ground Form 1
Settling on foundation



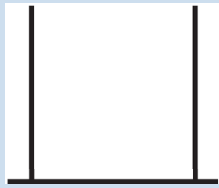
Shaft Ground Form 2
with Concrete Sur-
rounding



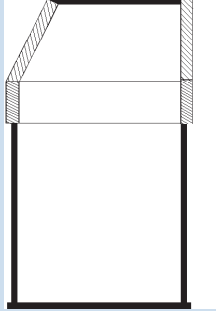
Shaft Ground Form 3
Full-encased foun-
dation



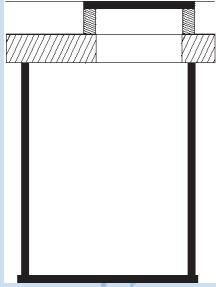
Shaft Ground Form 4
Without additional
Foundation



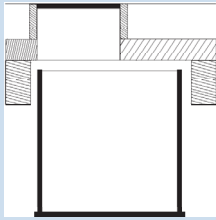
Cover Structure 1
Standard Concrete-
Conus



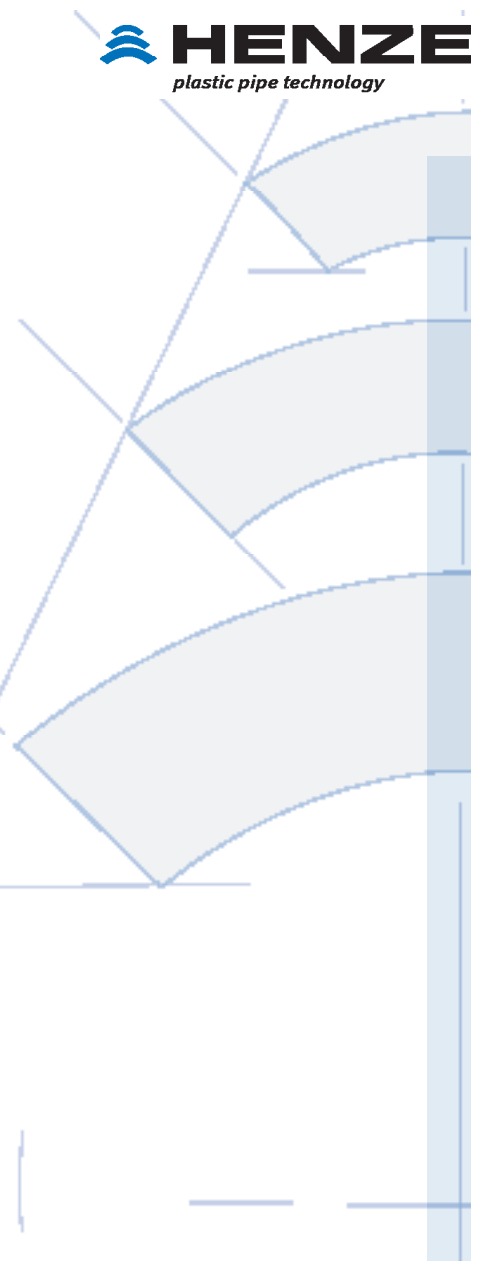
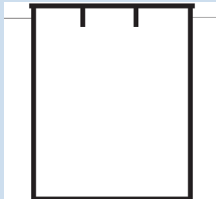
Cover Structure 2
Simple Supported
Cover



Cover Structure 3
Separately Supported
Cover



Cover Structure 4
With Flat Roof



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Questionnaire for Static Calculations for the Restoration of Sewage Canals and Pipelines by Relining Short resp. Long Pipes

PROJECT _____

CONSTRUCTION SITE _____

GEOMETRY:

- Circle Profile Nominal Width DN _____ mm
- Single Profile Wall thickness B/H _____ mm
- Other Profile Exact Measurements see separate Paper

GENERAL DESCRIPTION OF DAMAGE (VGL. ATV-M 143):

- Washing out the Sole
- Cracks Vertex
- Cross Cracks
- Broken Pieces
- Pipe Defects max. Expansion _____ mm

Other Damages: _____

EVALUATION OF THE LOAD CAPACITY:

- Old Pipe Condition I: Old Pipe load capability alone
- Old Pipe Condition II: Old Pipe-Floorsystems carrying load
- Old Pipe Condition III: Old Pipe-Floorsystems cannot carry load in the longterm

General Information if necessary of existing old pipe deformations _____

RESTORATION PROCEDURE:

- Short Pipe Procedure
- Long Pipe Procedure

Specifics _____

IMPACTS

Table water above Pipe Sole max. max hw,So = _____ m

Specifics (i.e. Imperfections) _____

Storing Length: _____ m

Gradient: _____ %

- No Filling of the Liners with Water _____
- Partial Filling of Inliner with Water
- Complete Filling of Inliner with Water
- Additional Weight in Liner

Specific Gravity of the Dimmers _____

Dawning Column and Vertex _____ mm

SENDER _____

_____ kN/m³

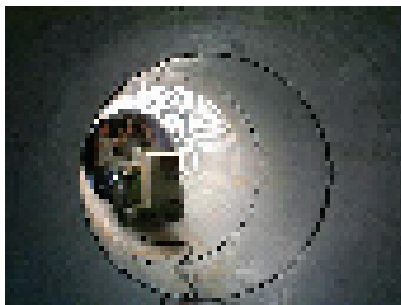
Datum Stempel

Unterschrift

Connection technology



The quality of a canalisation pipeline is essentially dependant on the joint of the individual pipes. We consider welding the pipes together the best solution. There are three different welding techniques, which are applied according to the DVS regulations.



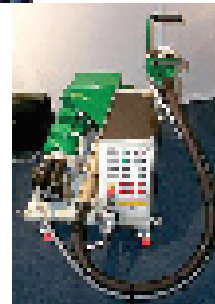
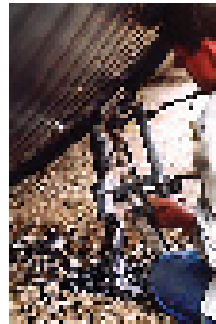
1. Extrusion Welding DVS 2207 Part 4 and DVS 2209

The extrusion welding connections are made according to DVS 2209 process II and process III. This machine welding process secures quality and speed. Welding can only be done by specialized staff. Prerequisite is a training with a completed examination in welding techniques. This kind of welding can be applied to all pipes of the form I with socket, spigot and the form III. Both sides should have flat pipe ends, independent of the

profile type.

Pipes up to diameter ID 800 are connected with a knit line on the outside.

Pipes above diameter ID 800 are generally connected with a knit line on the inside. The connection as of ID 800 can also have a knit line on the inside and outside, as long as there are special needs due to added loads. This could become necessary due to high inner or outside water pressures as well as large axial forces. They all need to be taken into consideration during planning. Double walled canalisation pipes can be welded together on the inside and outside through this process as of diameter ID 400.



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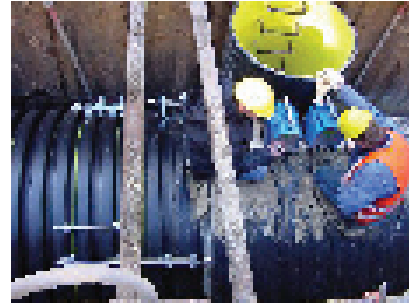
2. Hot Plate but Welding according to DVS 2207-1

This kind of welding is applied along with extrusion welding in canalisation pipelines according to profile Nr. 4, form III and has on the both sides flat pipe ends. It can also be applied on full wall pipes.

3. Electrofusion Welding according to DVS 2207-1

For electrofusion welding we have integrated an electrofusion socket. Welding then takes place automatically between socket and spigot. The electrofusion socket is

available from diameters ID 400 to ID 2400. The short and longterm tests with sub and supersoil profile pipes let us conclude, that this welding joint is superior to other welding processes. The knit line can be tested in several modes. Please find more information within the brochure electrofusion welding socket.



**Canalisation Pipe
Profil Spiral Pipe according to DIN 16961**

PIPE DIAMETER	Pipe Form I	Pipe Form II	Pipe Form III	Pipe Form IV
	Profil Nr.1-5	Profil Nr.1-5	Profil Nr.4 ²⁾	Profil Nr.1-3
	SCHWEISSMUF-FE-SPITZENDE	BEIDSEITIG GLATTE ROHRENDEN	BEIDSEITIG GLATTE ROHRENDEN	ELEKTROFUSIONSMUFFE
350	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
400	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
450	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
500	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
550	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
600	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
700	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
800	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
900	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
1000	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
1200	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
1300	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
1400	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
1500	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
1600	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
1800	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
2000	EXTRUSION	EXTRUSION	HOT PLATE BUTT WELDING	ELECTROFUSION WELDING
2200	EXTRUSION	EXTRUSION		ELECTROFUSION WELDING
2300 ¹⁾	EXTRUSION	EXTRUSION		ELECTROFUSION WELDING
2400	EXTRUSION	EXTRUSION		ELECTROFUSION WELDING
2600	EXTRUSION	EXTRUSION		
3000	EXTRUSION	EXTRUSION		
3600	EXTRUSION	EXTRUSION		

1) In Vorbereitung
2) Gilt auch für doppelwandiges Kanalrohr

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WELDING PROCESS	SEEM TESTING WITH ELECTRIC HIGH TENSION ACCORDING TO DVS 2206*	LEAKAGE TEST ACCORDING TO DIN EN 1610*	WELDING SEEM-TEST WITH LOW PRESSURE ACCORDING TO DVS 2206*
EXTRUSION WELDING	X	X	
HOT PLATE BUTT WELDING		X	X
ELECTROFUSION WELDING		X	

* Zulässige Prüfverfahren





Crossover Parts

With special connection parts we can couple Plastic pipe with other materials easily i.e. concrete, stone clay pipe, GFK FRP or ductile iron. Specially chosen parts are herefore available and assure a quality connection. The design of the parts makes them adaptable to almost every technical problem, which may occur.



Hint for HDPE pipe joints

If pipes are connected to HDPE shafts the following must be taken into consideration:

- ⚡ HDPE pipes have a very high expansion degree due to temperature variation.
- ⚡ Long pipelines and their shaft connections can expand in length during temperature increase. If the shafts and pipes are not buried and hence fixed in their position this can lead to position changes.
- ⚡ The connected pipelines are therefore to be covered immediately after connection to the top of the pipe with pipe bedding.

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Introductory Notes

PEHD pipes are smooth surfaced and flexible. Pipe and soil together are the carrying force. The stability of the installed pipes is dependant on the surrounding soil of the pipe and its load qualities. Therefore special attention needs to be paid to the pipe bedding and how the pipe trenches are back filled. The same applies, when special materials are chosen for the pipe bedding and back filling of trenches. Installation and required soil preparations are described and regulated in DIN EN 1610 and ATV-DVWK-A 139.

Pipe Trench Sole

The pipe trench bottom should have the same load capacity as the standing soil. If the soil is loose due to excavation, the initial load capacity needs to be reinstated with compacting equipment. Water is to be kept away from the ditch bottom.

Pipe Bearing

The support should maintain an equal load distribution. The pipes are therefore to be placed in such a manner that no line or pressure spots are available. If one wants sockets one needs to

make indentations in the trench supports. If the pipes are profiled the interspaces are to be filled with bedding soil.

The bearing angle usually is 180°. The bearing extends from the ditch bottom to the pipe tip. The thickness of the bearing SD underneath the bottom of the pipe is: $SD = 100 \text{ mm} + 1/10$ of the diameter of the pipe in mm.

The pipe ID 1000 results in $SD = 100 + 0.1 \times 1000 = 200 \text{ mm}$. The bearing surface is to be put in layers under intensive compaction until the pipe top is reached. As compacting equipment one can use hand compacters or light compacting tools. The area of the pipe gore gusset should also be compacted well. The bearing angle of 180° is achieved by intensive compacting.

Concrete Bearing

A direct bearing on concrete is not permissible for bendable pipes. If a concrete slab is necessary due to technical reasons, an intermediate layer out of sand and pea gravel with the minimal thickness of 100 mm +1/10 diameter is to be done.

Pipe Bedding

The pipe bedding of the pipeline is part of making the pipe bearing. In a zone of 300 mm around the pipe only stone free, compactable soil may be used.

The soil has to meet the same requirements as the material of the pipe bearing.

Around the pipeline and up to

for PE-HD-Profile Spiral Pipe

300 mm over the pipe head the soil is to be installed in layers maximum 300 mm and to be compacted.

The soil may not evade into less compacted ground layers (i.e. adjacent ground) and this must be permanently prevented by constructive measures. (i.e. packing in geotextile). Simple covering of the pipeline takes place above the pipe bedding, also 300 mm over the pipe top. The installation of soil must take place in such a manner, that sufficient compaction is achieved. Up to 1.0 m above the pipe top only light compaction equipment is permissible.

Covering the Pipe

On hillside one needs to take precautions, that ground pressures from one side are countered by sufficient resistance abutment / thrust bearing from the other side.



Material Pipe Bearing and Pipe Bedding

Pipe bearing and pipe bedding are preferably done from gravel or gravel sand mixture. The material should not exceed maximum kernel size of 16 mm and must be well graded and well compactable.

Laying the Pipe

Using hydraulic means can also improve the soil. The soil compaction and characteristics of the soil need to meet the static calculations.

Sequence of Operations

- ⚡ Enter the pipes into the ditch with textile carrying belts or by hand. They may not be thrown or allowed to fall as damages may occur.
- ⚡ Align the pipes. Thereby the spigots are to be entered into the socket in such a way, that the pipe end is evenly entered at all points and meets the socket end. This is necessary for the proper execution of the knit line.
- ⚡ Pipes should be located by filling in bedding material and compacting the soil sidewise.
- ⚡ Welding the knit line
- ⚡ Enter bedding and pipe bearing ground in layers and compact it on both sides with equal intensity. Watch out and control possible heat related deformation. Thereby pay attention that ovalisation does not reach 2% or exceed 2%.
- ⚡ Cover trench. Control ovalisation of pipes. This should not exceed 2% after installation.
- ⚡ When entering additional structures pay attention that the soil and pipe bedding is not loosened, when you move the structure.

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Preliminary Remarks

PEHD pipes are bendable. Pipe and soil together are the carrying force. The stability of the installed pipes is dependant on the surrounding soil of the pipe and its carrying qualities. Therefore special attention needs to be paid to the pipe bedding and filling the pipe trenches. This also applies to making the pipe bedding and filling the trench with qualified materials. The installation and the required soil are regulated in DIN 4033 and DIN EN 1610.

Foundation Bed

The foundation of the shaft must be load resistant and compacted according to the static calculations. Its solidity is dependant on the permissible ground compaction. The vertical loads emerging from the shaft and pressuring on the shaft may not increase above the designed load capacity of the foundation. The foundation of the shaft is dependant on the construction shaft floor. The type of the shaft ground needs to be statically defined and specified. The following static calculations can be applied:

- ⚙ Clean layer out of gravel
- ⚙ Clean layer out of concrete.
- ⚙ Reinforced concrete sheet as foundation

The type of foundation should be coordinated with the shaft manufacturer.

Shaft Bedding

When filling the ditch the shaft structures need a circumambulating shaft bedding. The shaft bedding is to be made in such a manner, that the shaft pressure around its circumference is spread evenly.

Permissible Material for Bedding:

For the bedding one should preferably choose a mixture of gravel, sand and or a gravel sand mixture. The utilized material should not exceed a maximum grain size of 16 mm and must be graded and well compacted.

Layer Thickness of the Bedding:

- ⚙ Installation in binding soils: circumference around the shaft should be 1.0 m.
- ⚙ Installation in non binding soils: circumference around the shaft should be 0.5 m (attention work area).

Installing the bedding and backfilling

- ⚙ Bedding material and backfilling material to be inserted in layers up to 300 mm.
- ⚙ Up to shaft diameter ID 1600 compacting should be done with a light vibration compressor.
- ⚙ As of diameter ID 1800 compaction can take place with a light plate vibrator or light vibration tamper.
- ⚙ The shaft bedding and backfilling should be compacted Dpr. 95% to 97% or according to guidelines.
- ⚙ Uneven compaction can lead to deformation of the shaft pipe, therefore deformations should be controlled during compaction process.

Concrete Bedding

- ⚙ A shaft out of PEHD can also be bedded in concrete, if necessary. The concrete is to be entered under moist soil conditions in layers.
- ⚙ The compaction takes place as described.

Concrete Filling

In order to stiffen the ground structure and the run off for sewage shafts filling concrete can become necessary. It is entered between berm and ground bottom sheet. Filler tubes or openings are provided in the shaft.

Entering concrete filling into the building pit before the shaft is entered

If there is ground water the concrete should be entered before the shaft is employed.

- ⚡ Place shaft on even area ground.
- ⚡ The concrete needs to be in a liquid state
- ⚡ Enter the concrete in the provided openings and if necessary compact it.
- ⚡ Allow shaft to stand until the concrete has attained solidity, which allows lifting and settling the shaft without damaging the concrete foundation (the PEHD ground board bends if the concrete is not sufficiently tied in).
- ⚡ If table water is available only place the shaft after the concrete has reached the necessary solidity. This can be determined by personal.
- ⚡ Close the provided concrete openings by welding in the spouts.
- ⚡ Settle the shaft.

Insert concrete filling into pit after the shaft has been entered

If there is no ground water or it is held back, the concrete filling can be entered after the shaft has been placed. Until the required solidity is attained it is important to make sure that no ground water enters to the bottom sheet.

- ⚡ One can enter concrete filling before or after backfilling or after backfilling of the building pit.
- ⚡ The concrete needs to be fluid.
- ⚡ Enter the concrete through the provided openings and if necessary compact it.
- ⚡ Close the openings by welding in the spouts.



Concrete parts

If the PEHD shaft is covered with some concrete shaft element (i.e. rings, cone), the following should be taken into consideration:

- ⚡ Before the bedding and backfilling is done, concrete elements (i.e. rings, cone) should be put on the shaft.
- ⚡ Between the PEHD shaft and concrete element a gasket should be placed.
- ⚡ Backfilling and bedding should be done as described under point 3.
- ⚡ Further concrete parts should be placed and step by step backfilling and bedding should be completed.

Working steps Uplift protection

If uplift forces are expected to affect the shaft structure an uplift protection becomes required.

The shaft manufacturer should be consulted regarding the structural design before production of the shaft. During the building phase the shafts are to be secured in unfilled building pits or pipe ditches and to be secured against up lifting by rain or other occurrences.

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Groupe G1: Non Binding Soils

- ≡ GE: tightly graded gravel
 ›river and beach gravel, terrace gravel, moraine gravel, volcanic slurry and ashes› predominantly one grain size
- ≡ GW: wide graded gravel-sand mixture
 ›river and beach gravel, terrace gravel, moraine gravel, volcanic slurry and ashes› including several grain sizes spread on grain line
- ≡ GI: intermittent graded gravel-sand mixture
 ›river and beach gravel, terrace gravel, moraine gravel, volcanic slurry and ashes› grain line is spread apart on several grain sizes, single grain sizes are missing
- ≡ SE: narrowly graded sand
 ›Dunes-and riversand, valley sand, basin sand, tertiary sand› predominantly one grain size
- ≡ SW: widely graded gravel-sand mixtures
 ›dunes and river sand, valley sand, basin sand, tertiary sand› predominantly one grain size
- ≡ SI: intermittently graded gravel-sand mixtures
 ›moraine sand, terrace sand, beach sand› single grain sizes are missing

Group 2: Weak Binding Soils

- ≡ GU: gravel-silt mixtures
 ›weathering gravel, hill debris, clay gravel› wide graded grain line, fine grain share silt
- ≡ GT: gravel-clay mixtures
 ›weathering gravel, hill debris, clay gravel› wide or intermittent graded grain line, fine grain share clay like
- ≡ SU: sand-silt mixtures
 ›flottsand› wide graded grain line, fine grain share silt like
- ≡ ST: sand-clay mixture
 ›clay like sand, creeping sand› wide graded grain line, fine grain share clay like

Groupe 3: Binding Compound Soils, Silt

- ≡ GU:
 - ›weathering gravel, hill debris, clay like gravel
 - ›wide graded grain line, fine grain share 15-40% silt like
- ≡ GT: gravel-clay mixture wide graded grain line, fine grain share 15-40% clay like
- ≡ SU: sand-silt mixture
 - ›meadow clay, sand loes
 - ›wide graded grain line, fine corn share 15-40% silt like
- ≡ ST: Sand-clay mixture
 - ›bed-load clay, bed-load marl
 - ›wide grade grain line, fine grain share 15-40% clay like
- ≡ UL: light plastic silt
 - ›loes, flood clay
 - ›fine grain share above 40%, low plasticity
- ≡ UM: middle plastic silt
 - ›see clay, basin silt
 - ›fine grain share above 40%, medium plasticity

Gruppe 4: Binding Soils

- ≡ TL: fairly plastic clays
 - ›bed-load marl, tape clay
- ≡ TM: medium plastic clays
 - ›loesclay, basin clay, keuper marl
- ≡ TA: strongly plastic clays
 - ›tarras, septarian clay, jurassic clay
- ≡ OU: silt with organic admixtures
 - ‹see chalk, gravel kur, topsoil
- ≡ OT: clays with organic admixtures
 - ›silt, lead
- ≡ OH: coarse to mixed grain soils with admixture of mould kind
 - ‹topsoil
- ≡ OK: coarse to mixed grain soils with chalk like and pebble like developments
 - ›chalk sand, tuffsand
- ≡ UA: silts with backfilling out of foreign substances
 - ›garbage, slags, building rubble, industrial garbage

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**For wastewater and form parts from Polyethylen
High-Density PE 80 oder PE 100, hergestellt according to DIN 16961**

BUILDING PROJECT _____

BUILDING OWNERS _____

PLANNING AND BAUVORHABEN _____

DATE _____

Technical Preliminary Remarks for PEHD Profile Spiral Pipe

Polyethylene high density (HDPE) is the material we produce spiral pipe with. Researches of pipe systems have shown, that the material is chemically resistant, corrosion resistant, abrasion resistant, high dent gnaw resistant, and flexible. Our material must at least fulfil the quality standard of minimum PE 80. The density of the pipe systems and the resistance against in growing roots must be permanently warranted. Therefore all elements of the system should be welded together.

All processed HDPE materials should be 3rd generation and have a bimodal mass distribution. The manufacturer must give proof of the used materials with a manufacturing certificate, assessing not less than 2.2 according to DIN EN 10204.

HDPE profile wound pipe are produced applying spiral wound pipe technology according to DIN 16961 part 1 and 2. The manufacturing is required to have internal and external quality control.

For producing HDPE spiral wound pipe and other semi finished products only those companies are permitted, which have external surveillance by an official auditing institution i.e. TÜV Rheinland, Dpt. Kunststoff (plastics), Cologne, Staatliche Materialprüfungsanstalt Darmstadt (public material auditing institution) Darmstadt, SKZ, etc.

For all HDPE constructions as well as welding knits the DVS sheets and guidelines of AG W 4 apply.

Factory-made welding of pipes and shaped pieces must be done according to guideline DVS 2209 and DVS 2207 part 4. Welding may only be done by qualified welders with a valid welding examination. The proof is expressly required. If necessary we can provide experienced welders. A welding protocol report is required according to DVS 2207, part 4.

The type of welding applied at the building site for pipe connections with pipes or shaped pieces is socket welding with incorporated heating elements. The welding knits are to be done according to the information offered by the manufacturer. The welding joints must fulfil as minimum requirement the guidelines of DVS 2203 part 5. For exceptions and in special arrangements with the orderer extrusion welding can also be used. It is to be executed according to DVS 2209 – only process II + III, head over knits process III - as well as DVS 2207 part 4.

The wallthickness is determined according to static requirements and the individual installation circumstances. Suitability of the HD-flush minimum wallthickness has to be warranted and proven to be minimum 5 mm of the inner base wall. For pipes with profiled outside surface in addition to base wall thickness $s = 0,005 \cdot ID + 0,5$ (specifications in mm) apply.

Before the pipes are manufactured the buyer needs to supply a critical static calculation for critical installation situations. The static calculation for pipes and all HDPE constructions is according to guideline DVS 2205 part 1 and 2 as well as ATV-DVWK A 127 (3rd edition). The minimum pipe stiffness according to ATV-DVWK A 127 section 6.3.3 should be maintained.


Guideline for laying the pipelines is the DIN EN 1610 and ATV DVWK A 139. Tightness examinations are done according to DIN EN 1610.

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Position	PROFILWICKELROHR DN 400 BIS 2400	UNIT PRICE €	TOTAL PRICE €
	<p>Wound Profile pipe DIN 16961, HDPE ID With integrated electrofusion welding socket and spigot Brand Henze pipe technologies</p> <p>Pipe has smooth and inspection friendly orange-yellow inliner manufactured in coextrusion process Ring stiffness according to static requirements, in production lengths of 6m delivered to the building site, correctly unloaded and installed according to DIN EN 1610. Welding to be accomplished under guidelines of the manufacturer applying electrofusion.</p> <p>Manufacturer: Henze GmbH Delivery proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen manufacturers _____</p> <p>Amount _____ m</p>		
	<p>FOR STATIC VERIFICATION: Security Grade: A</p> <p>Minimum cover: _____ m</p> <p>Maximum cover: _____ m</p> <p>Traffic Loads: _____</p> <p>Ground water _____ under GOK</p> <p>Natural Ground: _____ Proctor density: _____-%</p> <p>Bedding _____ Proctor density: _____-%</p> <p>The static calculation needs to be forwarded to the manufacturer before beginning building.</p>		
			

Position	PROFILE SPIRAL PIPE ID 300 TO ID 3600	UNIT PREIS €	TOTAL PRICE €
	<p>Wound Profile pipe DIN 16961, HDPE ID With socket and spigot for extrusion welding Brand Henze pipe technologies</p> <p>Pipe has smooth and inspection friendly orange-yellow inliner manufactured in coextrusion process Ring stiffness according to static requirements, in production lengths of 6m delivered to the building site, correctly unloaded and installed according to DIN EN 1610. Pipe connection to be calculated according to preliminary remarks</p> <p>Manufacturer: Henze GmbH Delivery proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen manufacturers: _____</p> <p>Amount: _____ m</p>		
	<p>FOR STATIC VERIFICATION: Security Grade: A</p> <p>Minimum cover: _____ m</p> <p>Maximum cover: _____ m</p> <p>Traffic Loads: _____</p> <p>Ground water _____ under GOK</p> <p>Natural Ground: _____ Proctor density: _____-%</p> <p>Bedding _____ Proctor density: _____-%</p> <p>The static calculation needs to be forwarded to the manufacturer before beginning building.</p>		

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POSITION	BRANCH 45° DN _____	UNIT PRICE €	TOTAL PRICE €
	Production of connection spout on main pipe ID _____ Made out of HDPE Incl. connection piece with crossing for _____ Delivery, installation and welding Manufacturer : HENZE GmbH Delivery proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20 Chosen manufacturer: _____ Amount: _____ units		
POSITION	BRANCH 60° DN _____	UNIT PRICE €	TOTAL PRICE €
	Production of connection spout on main pipe ID _____ Made out of HDPE Incl. connection piece with crossing for _____ Delivery, installation and welding Manufacturer : HENZE GmbH Delivery proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20 Chosen manufacturer: _____ Amount: _____ units		
POSITION	BRANCH 90° DN _____	EINHEITSPREIS €	TOTAL PRICE €
	Production of connection spout on main pipe ID _____ Made out of HDPE Incl. connection piece with crossing for _____ Delivery, installation and welding Manufacturer : HENZE GmbH Delivery proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20 Chosen manufacturer: _____ Amount: _____ units		

POSITION	PHASE OUT TO 15° AS SEGMENT PIPE HDPE ARC	UNIT PRICE €	TOTAL PRICE €
	<p>Phase out (arc) as addition to the pipe position</p> <p>Wound profile pipe ID _____ according to ID 16961, execution with socket and spigot for electrofusion welding or extrusionwelding</p> <p>Phase out to 15° from the pipe axis Radius of the arc: $R = 1.0 \cdot d$</p> <p>Manufacturer: HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturer: _____</p>		
POSITION	PHASE OUT TO 30° AS SEGMENT PIPE HDPE ARC	UNIT PRICE €	TOTAL PRICE €
	<p>Phase out (arc) as addition to the pipe position</p> <p>Wound profile pipe ID _____ according to ID 16961, execution with socket and spigot for electrofusion welding or extrusionwelding</p> <p>Phase out to 30° from the pipe axis Radius of the arc: $R = 1.0 \cdot d$</p> <p>Manufacturer: HENZE GmbH oder gleichwertig Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturer: _____</p> <p>Amount: _____ Units</p>		









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POSITION	PHASE OUT TO 45° AS SEGMENT PIPE HDPE ARC	UNIT PRICE €	TOTAL PRICE €
	<p>Phase out (arc) as addition to the pipe position</p> <p>Wound profile pipe ID _____ according to ID 16961, execution with socket and spigot for electrofusion welding or extrusionwelding</p> <p>Phase out to 45° from the pipe axis Radius of the arc: R= 1.0*d</p> <p>Manufacturer: HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Manufacturer: _____</p> <p>Amount: _____ Units</p>		
POSITION	PHASE OUT TO 60° AS SEGMENT PIPE HDPE ARC	UNIT PRICE €	TOTAL PRICE €
	<p>Phase out (arc) as addition to the pipe position</p> <p>Wound profile pipe ID _____ according to ID 16961, execution with socket and spigot for electrofusion welding or extrusionwelding</p> <p>Phase out to 60° from the pipe axis Radius of the arc: R= 1.0*d</p> <p>Manufacturer : HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Manufacturer: _____</p> <p>Amount: _____ Units</p>		
POSITION	PHASE OUT TO 60° AS SEGMENT PIPE HDPE ARC	UNIT PRICE €	TOTAL PRICE €
	<p>Phase out (arc) as addition to the pipe position</p> <p>Wound profile pipe ID _____ according to ID 16961, execution with socket and spigot for electrofusion welding or extrusionwelding</p> <p>Phase out to 90° from the pipe axis Radius of the arc: R= 1.0*d</p> <p>Manufacturer : HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Manufacturer: _____</p> <p>Amount: _____ Units</p>		

POSITION	TANGENTIAL SHAFT ID 1000	UNIT PRICE €	TOTAL PRICE €
	<p>Shaft mantle pipe DIN 16961 HDPE ID 1000 Pipe with smooth and inspection friendly orange-yellow inliner produced in coextrusion</p> <p>Shaft attached to the side of the main pipe ID _____ And lead with straight passage Passage pipe with socket and spigot for electrofusion welding or extrusionwelding</p> <ul style="list-style-type: none">  Flat, stepping safe floor with gradient inclined to the main pipe  Safety steps  Lifting and transportation attachments hooks  Building height from the floor to GOK G L _____ m <p>Shaft open, prepared to take a SB concrete-cover Calculation additionally.</p> <p>Manufacturer: HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturer: _____</p> <p>Amount: _____ Unit</p>		
POSITION	TANGENTIAL SHAFT HDPE DN 1000 WITH SEGMENT PIPE ARC	UNIT PRICE €	TOTAL PRICE €
	<p>Shaft mantle pipe DIN 16961 HDPE ID 1000 Pipe with smooth and inspection friendly orange-yellow inliner produced in coextrusion</p> <p>Shaft attached to the side of the main pipe ID ____ And lead with straight passage Passage pipe with socket and spigot for electrofusion welding or extrusionwelding</p> <p>Segment arc bend of the main pipe according to local site measuring</p> <p>Phase out to _____ ° Radius of the arc: $R=1.0 \cdot d$</p> <ul style="list-style-type: none">  Flat, stepping safe floor with gradient inclined to the main pipe  Safety steps  Lifting and transportation attachments hooks  Building height from the floor to GOK G L _____ m <p>Shaft is open, ready to carry a SB-load erosion plate with gasket Calculation additionally</p> <p>Manufacturer: HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturer: _____</p> <p>Amount: _____ Unit</p>		






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POSITION	PASSAGE SHAFT ID _____	UNIT PRICE €	TOTAL PRICE €
	<p>Wound Profile pipe DIN 16961, HDPE</p> <p>Shaft is delivered completely prefabricated Shaft mantle pipe with smooth and inspection friendly orange-yellow inliner in coextusion</p> <p>Building height: _____ m from floor to GOK GL For the shaft statics need to be made for all load possibilities. The shaft is installed in traffic area. in area with traffic load Uplift safeties need to be statistically proven and adjusted to the price. The shaft wall and the construction needs to be designed as self carrying parts.</p> <p>Manufacturer : HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturers: _____</p> <p>System shaft consists of: HDPE floor with berm and flow running chute / duct to the building side with concrete filling Plastic FRP ladder b width =300mm Entrance help support made out of stainless steel</p> <p>Intake ID _____</p> <p>Side Intake: ID _____</p> <p>Drain: ID _____</p> <p>Gradient: _____ °</p> <p>The shaft mantle needs to be prepared with concrete prefabricated parts according to DIN 4034 The steel concrete cover sheet is separately compensated for.</p> <p>Amount: _____ Units</p>		
	<p>FOR STATIC VERIFICATION: Security grade: A Building height for shaft: _____ m</p> <p>Traffic loads: _____</p> <p>Ground Water: _____ m under GOK</p> <p>Natural Ground: G _____ ; Proctor Density: _____ %</p> <p>Bedding: G _____ ; Proctor Density: _____ %</p>		








POSITION	WALL BINDING TYPE 1 OUT OF HDPE ID _____	UNIT PRICE €	TOTAL PRICE €
	<p>Henze wall binding type 1 is done for water pressure tightness and tensile strength of wound profile pipes according to DIN 16961 for concrete walls. It consists of:</p> <ul style="list-style-type: none">  HDPE flange with round cord string gasket  Raw, untreated steel flange  Untreated set of screws made out of stainless steel <p>Delivery and installation Calculation additionally</p> <p>Manufacturer: HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturer: _____</p> <p>Amount: _____ Units</p>		
POSITION	WALL BINDING TYPE 1 OUT OF HDPE ID _____	UNIT PRICE €	TOTAL PRICE €
	<p>Henze wall binding type 1 is done for water pressure tightness and tensile strength of wound profile pipes according to DIN 16961 for concrete walls. It consists of:</p> <ul style="list-style-type: none">  Welded on HDPE collar and  Stainless steel tensions clamped on EPDM-gasket <p>Delivery and installation Calculation additionally</p> <p>Manufacturer : HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturer: _____</p> <p>Amount: _____ Unit</p>		





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POSITION	WALL CAPSULE HDPE TYPE 1 ID _____	UNIT PRICE €	TOTAL PRICE €
	<p>Henze Capsule type 1 as shaft lining Aligned to the main pipe as ready made part for pressure pipe tight and sealed to Profile Spiral Pipe according to DIN 16961 for concrete structures.</p> <p>Concrete Wall Thickness: s= _____ cm Consisting especially of:</p> <ul style="list-style-type: none">  PEHD Wall Capsule s= _____ mm  PEHD flange with circle string seal  Steel flange untreated  Set of steel screws untreated <p>Delivery, installation and welding together with the main pipe applying Extrusion welding.</p> <p>Manufacturer : HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturer: _____</p> <p>Amount: _____ Units</p>		
POSITION	WALL CAPSULE HDPE TYPE 2 ID _____	UNIT PRICE €	TOTAL PRICE €
	<p>Henze Capsule type 2 as shaft lining Aligned to the main pipe as ready made part for pressure pipe tight and sealed to Profile Spiral Pipe according to DIN 16961 for concrete structures.</p> <p>Concrete Wall Thickness:s= _____ cm</p> <p>Consisting especially of:</p> <ul style="list-style-type: none">  PEHD Wall Capsule s= _____ mm  welded on PEHD Flange  EPDM-sealing applied with stainless steel tensioners <p>Delivery, installation and welding together with the main pipe applying extrusion welding.</p> <p>Manufacturer: HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturer: _____</p> <p>Amount: _____ Units</p>		





POSITION	HOUSE CONNECTION SADDLE ID 150	UNIT PRICE €	TOTAL PRICE €
	<p>Henze-house connection saddle for electrofusion welding for wound profile pipe ID _____ exit DA OD 160 Side intake DA OD 160 to the main pipe with intake gradient 90°. The place is determined by local requirements</p> <p>To be calculated into the price:</p> <ul style="list-style-type: none">  Opening up the main pipe by drilling  Doing the welding connection with electrofusion welding <p>Manufacturer : HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturer: _____</p> <p>Amount: _____ Units</p>		
POSITION	HOUSE CONNECTION SADDLE ID OD 150	UNIT PRICE €	TOTAL PRICE €
	<p>Henze-house connection saddle for electrofusion welding for Wound profile pipe ID _____ with PVC/stoneware crossing flange for pipe DA OD 160. Side intake DA OD 160 to the main pipe with intake gradient 90°. The place is determined by local requirements.</p> <p>To be calculated into the price:</p> <ul style="list-style-type: none">  Opening up the main pipe by drilling  Doing the welding connection with electrofusion welding via electro fusion <p>Manufacturer: HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturers: _____</p> <p>Amount: _____ Units</p>		

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internet: www.henze-gmbh.de

POSITION	HOUSE CONNECTION SADDLE ID 150	UNIT PRICE €	TOTAL PRICE €
	<p>Henze-house connection saddle for electrofusion welding for</p> <p>Wound profile pipe ID _____ exit DA OD 160 Side intake DA OD 160 to the main pipe with intake gradient 90° The place is determined by local requirements</p> <p>To be calculated into the price:</p> <ul style="list-style-type: none">  Opening up the main pipe by drilling  Doing the welding connection with electrofusion welding. <p>Manufacturer : HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturer: _____</p> <p>Amount: _____ Units</p>		
POSITION	HOUSE CONNECTION SADDLE ID OD 150	UNIT PRICE €	TOTAL PRICE €
	<p>Henze-house connection saddle for electrofusion welding for</p> <p>Wound profile pipe ID _____ with PVC/stoneware crossing flange for pipe DA OD 160. Side intake DA OD 160 to the main pipe with intake gradient 90°. The place is determined by local requirements</p> <p>To be calculated into the price:</p> <ul style="list-style-type: none">  Opening up the main pipe by drilling  doing the welding connection with electrofusion welding via electro fusion. <p>Manufacturer: HENZE GmbH Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturers: _____</p> <p>Amount: _____ Unit</p>		

POSITION	TASIKO-KC STEEL CONCRETE COVER PLATE	EINHEITSPREIS €	GESAMTPREIS €
	<p>Tasiko-KC steel concrete cover plate for HENZE-Shaft building out of HDPE/PP</p> <p>ID _____</p> <p>With integrated, relocation safe tight elements in order to secure against dislocation of the cover of the shaft building. (The traffic loads are not transferred to the building!) Entry opening D 625 mm, prepared for the dislocation secure structure with customary in trade equalization rings and shaft cover.</p> <p>Poured in thread sleeve in order to enter the cover plate.</p> <p>Manufacturer: HENZE GmbH oder gleichwertig Delivery Proof: Henze GmbH Josef-Kitz Str. 9 53840 Troisdorf Tel: 02241/9819-0 Fax: 02241/9819-20</p> <p>Chosen Manufacturer: _____</p> <p>Amount: _____ Unit</p>		

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