

PE-HD pipes for street sewerage

# Stikan



# PE-HD pipes for street sewerage STIKAN

Sewage pipelines today have to perform a more difficult task than ever before. Every year, the amount of wastewater is higher, and the concentrations of aggressive and harmful media contained in sewage are also higher. In times of stricter regulations, due to the considerable fear that possible damage to sewage pipelines would lead to the leakage of fecal water and contaminate groundwater, surrounding land or even sources of drinking water, every effort should be made to prevent such catastrophes.

Long-term observations of the most common failures of sewer pipelines in European countries show that the highest number of damages occurs with rigid pipes, due to changing conditions in the immediate vicinity of the pipeline, which causes excessive local stresses on the pipeline and thus a high probability of permanent damage. In such cases, flexible pipes are the right solution, which is increasingly used in areas where there is a possibility of earthquakes, wetting of the earth during downpours and floods, and due to other factors.

The STIKAN pipe system consists of two-layer pipes made of high-density polyethylene (PE-HD), with an outer ribbed and smooth inner wall, which are the result of several decades of international development and fully meet the requirements for sewer systems. At the same time, they enable low installation costs, large material savings and extremely little burden on the natural environment.

# Properties



**Pipes with a structured wall made of PE-HD surely belong to the future, as they boast a number of excellent properties:**

- extremely low weight, which allows easier transport and easier installation
- excellent chemical resistance to aggressive media and surrounding soil (shown in the chemical resistance table)
- undoubted corrosion resistance,
- excellent physical properties and therefore increased safety, durability and reduced maintenance costs
- quick and easy installation of pipe systems
- practically unlimited temperature range at which pipelines can be laid and serviced (from -40 ° C up to + 80 ° C)
- smooth inner surface that reduces friction against the wall and provides excellent hydraulic properties
- excellent abrasion resistance, which ensures a long service life (comparison of wear shown in the pipe wear diagram)
- easy achievement of complete pipeline tightness, which is essential for environmental friendliness in times of serious environmental protection, as the pipes save more than 30% material and energy compared to conventional full-wall pipes, while allowing very simple recycling processes.

**PE-HD pipes for street sewerage:**

- two-layered: ribbed on the outside, smooth on the inside
- double safety

**Standards: SIST EN 13476**





# Material



Pipes and fittings are made of high density polyethylene (PE-HD), which has very good mechanical and chemical properties; is an extremely environmentally friendly material and is practically irreplaceable in the current time of constant search for economical and safe solutions in the field of wastewater pipelines.

Pigments are also added to the polyethylene, which enables different coloring of the pipes, and UV stabilizers, which enable greater resistance to weathering and slow down aging.

## The pipes are made of PE-HD raw material with the following characteristics:

density	$\geq 0,945$	g/cm <sup>3</sup>
melting point index MFI 190/5	0,4 - 1,3	g/10 min
modulus of elasticity ( $E_{bc}$ )	$\geq 800$	N/mm <sup>2</sup>
coefficient of linear thermal expansion	$1,3 - 2,0 \times 10^{-4}$	K <sup>-1</sup>
thermal conductivity coefficient ( <i>pri</i> 23°C)	0,35-0,40	W/mK
surface electrical resistance	$>10^{13}$	$\Omega$



# Production program



The pipes meet the requirements of STS-06/046, according to which the pipes for street sewerage are made.

The wall of the pipe consists of a profiled outer layer and a flat inner layer, which are welded between the ribs and form a homogeneous wall. The outer profiled layer greatly improves the mechanical properties of the pipe, and significantly increases the stiffness of the pipe in the radial direction. The flat and smooth inner side, in addition to additional safety, also enables ideal hydraulic properties and thus large unobstructed flows.



## Color:

The color of STIKAN pipes and fittings is black.



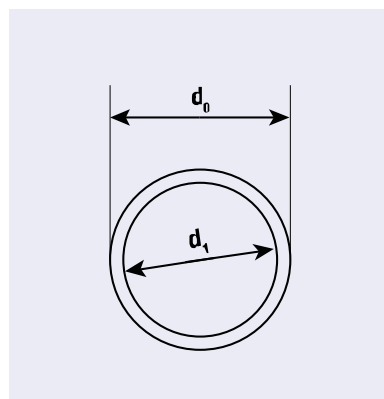
## Pipe circumferential stiffness:

**$SN \geq 4 \text{ kN/m}^2$  EN (ISO 9969) or  $S_{R24} \geq 31,5 \text{ kN/m}^2$  (DIN 16961)**

**$SN \geq 8 \text{ kN/m}^2$  EN (ISO 9969) or  $S_{R24} \geq 63 \text{ kN/m}^2$  (DIN 16961)**

Nominal diameter DN (mm)	Outer diameter $d_o$ (mm)	Inner diameter $d_i$ (mm)
160	160	136
200	200	176
250	250	218
300*	350	300
315	315	272
400	400	347
500	500	433
630	630	535
800	800	678
1000	1000	852
1200	1200	1030

\* Inner diameter



# Quality Assurance



The pipes are manufactured and tested in accordance with STS-06/046, which sets even higher quality requirements for the class and requires:

## **Regular control of input raw materials:**

- mass flow of melt
- long-lasting hydrostatic strength
- material density

## **Continuous inspection of pipes in the production process:**

- dimensional control (outer diameter, inner diameter, inner layer wall thickness, welded inner and outer layer wall thickness)
- control the appearance of the pipe (surface appearance, color, inscription on the pipe)
- impact resistance of pipes
- peak stiffness of the pipe

## **Periodic testing:**

- dimensional stability of the pipe
- pipe flexibility
- pipe creep module
- tightness of pipe joints and joint pieces.

Control and testing of both input materials and finished products is carried out continuously in our own testing laboratory. We also perform constant control and improvement of the production process, all with the aim of adapting the level of quality to the ever-increasing requirements of technical regulations and the wishes of users.

In parallel with the internal testing, we obtained approvals for STIKAN pipes from PE-HD for street sewerage from the competent institutions, as evidenced by the issued test reports.

# Chemical Resistance



Due to their paraffin structure, high-density polyethylene (PE-HD) pipes are highly resistant to many chemicals, so polyethylene pipes are also often used to transport acids, alkalis and saline solutions. Chemical resistance is especially important for the drainage of feces and wastewater, as sulfuric acid is regularly present in these pipelines, which is a decisive factor in the durability of pipe systems. Corrosion due to volatile sulfides also occurs above the liquid level, which is especially critical for all cementitious binder materials, as this corrosion can erode up to six millimeters of cement wall in one year.

The table shows the approximate chemical resistance of polyethylene pipes to individual media or groups of media at certain temperatures. More detailed data for the chemical resistance of PE-HD to media are collected in the technical report ISO TR 10358 and DIN 8075 Beiblatt 1. For the use of pipes in special cases, the manufacturer of the polyethylene raw material or the pipe manufacturer must be consulted in advance.

Chemical resistance of high density polyethylene pipes to individual media or groups of media at temperatures of 20 °C and 60 °C, where:

- (+) corresponds
- (0) partly corresponds
- (-) does not correspond to
- (\*) consultation required

Media	20°C	60°C
Acetone	+	+
Alcoholic beverages (up to 40%)	+	+
Ammonia (5 x additional conc.)	+	*
Lime	+	+
Asphalt	+	0
Petrol	+	0
Bitumen	+	0
Citric acid	+	+
Detergents	+	+
Nitric acid (up to 10%)	+	0
Ethanol (96%)	+	+
Formaldehyde (up to 40%)	+	+
Glycerin (technically pure)	+	+
Kerosene	+	0
Acids (aromatic)	+	+
Clay	+	+
Chlorinated water	+	+
Fuel oil	+	0
Flaxseed oil (technically pure)	+	+
Lugi	+	*
Methanol	+	+
Gas oil	-	-

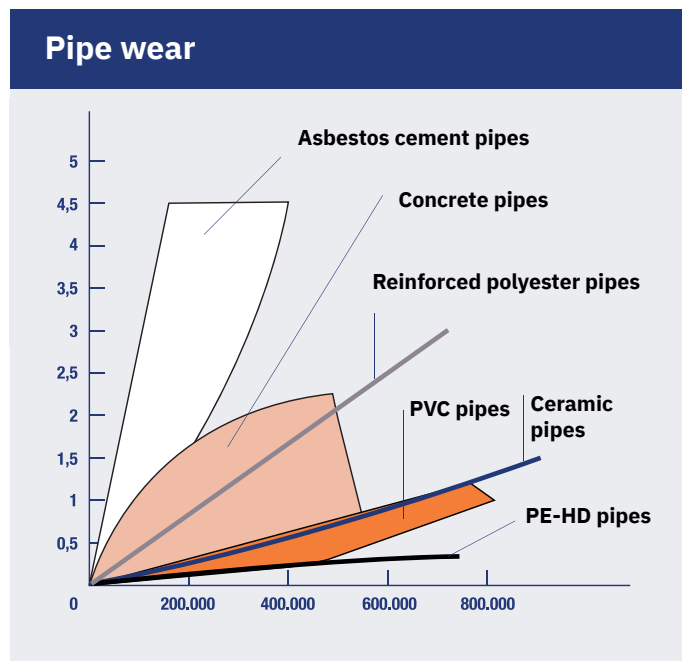
Media	20°C	60°C
Mineral oils	+	0
Mineral Water	+	+
Lactic acid	+	+
Milk	+	+
Sea water	+	+
Motor oils	+	0
Gas oil	+	0
Acetic acid	+	+
Petroleum	+	+
Beer	+	+
Vegetable oils	+	*
Castor oil	+	+
Fruit (vegetable) juices	+	+
hydrochloric acid	+	+
Liquid soap	+	+
Urine	+	+
Brake fluid	+	+
Animal oils	+	0
Mercury	+	+
Sulfuric acid (up to 10%)	+	+
Sulfuric acid (up to 30%)	+	+
Gas oil	-	-



## PE-HD pipes wear resistance

High density polyethylene (PE-HD) is extremely abrasion resistant and is one of the most resistant materials used to make pipes.

Extensive research on the wear of pipes made of various materials has been carried out at the University of Darmstadt on the basis of a recognized method by the Suddeutsches Kunststoff-Zentrum in Würzburg. The diagram shows the impressive properties that PE-HD pipes have in terms of wear resistance.





# Transport and Storage



PE-HD pipes, due to their high resistance to wear and impact and low weight, enable undemanding transport and storage procedures and practically do not require special protective measures. The pipes are still sufficiently tough and impact-resistant even at low temperatures (below 0 ° C). Nevertheless, reasonable action is required. Particular attention should be paid to sharp objects and edges that can permanently damage the pipe, so it is necessary to clean the means of transport and storage of sharp objects and protect sharp edges.

The pipes should be folded along their entire length and should be protected against slipping. The loading height should not exceed one meter. In the case of packaged pipes and multi-storey storage, it is necessary to ensure that the wooden frames of one pallet rest on the wooden frames of the pallet below it (wood on wood).

When loading or unloading pipes, do not pull over sharp edges or on the ground. We recommend the use of suitable tools, such as lifting straps.

Nominal diameter DN (mm)		160	200	250	315	400	500	630	800	1000	1200
Pipe length (m)	6	Number of pipes in the pallet									
		33	20	20	12	8	5	*	*	*	*
Total length of pipes in the pallet (m)		198	120	120	72	45	30	6	6	6	6

\* Pipes are not packed in a pallet

\*\* Pipes are packed in pallets with wooden frames during the production process.

The material from which the pipes are made is UV stabilized and thus quite resistant to ultraviolet rays and other weather conditions. However, we recommend that you store the pipes unprotected from the weather for a maximum of one year. In case of prolonged storage, the pipes must be protected from the sunbeams.



# Pipe connection



The STIKAN system is designed to easily connect pipes and various connecting pieces simply by inserting the pipe into the clamp joint piece. Merging technology allows minimal time consumption and effort and ensures optimal flow and minimal hydraulic losses.

EPDM sealing rings (compliant with DIN standard 4060) are used to seal the joints and guarantee a high level of security against leakage from sewage systems.

Before making the connection, the pipes

and fittings must be clean, and contact surfaces must be cleaned and undamaged. If the required pipe length is shorter than standard, cut the pipe straight (with a knife or a saw with fine teeth). Insert the seal between the second and third undamaged rib. Lubricate the plug end and clamp with appropriate friction reducing agent (grease for rubber seals, silicone oil, soap), which must not damage the seal or the pipe.

Push the plug-in end of the pipe with slight rotation into the clamp to the limit.

# Pipe installation



Pipe installation must be carried out by qualified workers under professional supervision.

When installing the pipes, it is necessary to follow the general guidelines for laying pipes that are laid in the ground and are roughly defined in the standard SIST EN 1610 and also in the standard DIN 4033.

With proper preparation of the bed (thickness 15 cm) with sand or other soil that can be hardened and which does not contain stones (grains up to 20 mm), good and gradual hardening of the backfill (degree of compaction according to Proctor  $D_{pr} > 95\%$ ) pipes and 30 cm above the top of the pipes, it is achieved that pipes covered with earth from 0.8

m and up to 8 m and even under the heaviest traffic load SLW 60 (according to DIN 1072) are not deformed above the permissible limit 6 %. If the pipe cover is less than 0.8 m, it is necessary to take care of load distribution (eg by concreting).

More detailed installation instructions can be found in the "Downloads" category, where, in addition to the catalogs, you will find guidelines for laying pipelines, which deal with ditch excavation, bed construction, overlapping and main backfilling of the pipeline. General guidelines for testing the tightness of laid pipelines in accordance with SIST EN 1610 are also available.



**Stigma cevni sistemi d.o.o.**

OIC Trzin, Motnica 8

SI - 1236 Trzin

**Phone:** 01/562-10-21,

**Fax:** 01/562-10-27

**Email:** [info@st-cs.si](mailto:info@st-cs.si)

[www.st-cs.si](http://www.st-cs.si)

