ST-CS
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PE-HD pipes for cable protection

# Stigmaflex®

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# Pipes for protection of telecommunication and electric power cables

The STIGMAFLEX® TK and STIGMAFLEX® EL piping systems offer the ideal solution to the fast-growing problems posed by the extraordinary expansion of need for communication connections and power lines. Experience in recent years shows that the current communication networks will become obsolete in a few years and that the capacity of communication lines laid along road connections will be exceeded several times over a period of thirty years, which represents the service life of the road.

Since the price of protective pipes is low compared to the total cost of laying cables, it makes sense to consider laying additional empty protective pipes during road construction or initial excavation. STIGMAFLEX® TK and STIGMAFLEX® EL pipes enable easy and quick cable installation later. Due to the large circumferential stiffness, they are only slightly deformed, and the pipes can be laid individually or in batches in several layers.

STIGMAFLEX® TK-K and STIGMAFLEX® EL-K pipes with diameters from 110 mm to 200 mm are produced in bars of standard length 6 m. In addition, pipes with diameters from 40 mm to 200 mm, are also produced in coils (standard length 50 m). That represents an additional advantage as it is simplified to change direction and avoid objects appearing on the pipeline route. Subsequently that means cheaper and faster pipe installation and easier pipe connection.

STIGMAFLEX® pipes are used in the construction of roads, tunnels, railways and other traffic, residential or industrial facilities. They offer excellent protection against mechanical and other harmful environmental influences and are suitable for a wide variety of cables, such as:

- telephone cables
- cables for television cable network
- optical cables
- high and low voltage power cables
- cables for road, rail and other traffic signals.

# Properties

**STIGMAFLEX® TK and STIGMAFLEX® EL pipe systems have a number of good properties, among which it is worth mentioning:**

- extremely low weight, which allows easier transport and easier installation
- excellent physical properties such as high circumferential stiffness and impact resistance, which ensures increased safety, durability and lower maintenance costs
- smooth inner surface that allows easy installation of cables
- exceptional corrosion resistance
- high insulation capacity and high voltage breakdown strength
- quick and easy installation of pipe systems
- lower joining costs, continuous laying and, due to flexibility, better adaptation to laying requirements
- possibility of installation even in extremely demanding temperature conditions (from - 40 ° C up to 80 ° C)
- environmental friendliness, as the pipes save more than 30% material and energy compared to conventional full-wall pipes, while allowing very simple recycling processes.

Standards: **SIST EN 61386**

# Materials

The pipes 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 long-lasting solutions in the field of cable protection. UV stabilizers are added to the polyethylene, which enables greater resistance to weathering and slows down aging.

| The pipes are made of PE-HD raw material with the following characteristics: | | |
|---|---|---|
| density | >0,947 | g/cm³ |
| melt index MFI 190/5 | 0,4 - 1,3 | g/10min |
| modulus of elasticity | ≥800 | N/mm² |

Coiled tubes have a low density polyethylene (PE-LD) inner tube wall to achieve greater flexibility.

| The pipes are made of PE-LD raw material with the following characteristics: | | |
|---|---|---|
| density | ~0,92 | g/cm³ |
| melt index MFI 190/5 | 0,25 - 0,9 | g/10min |
| modulus of elasticity | ≥200 | N/mm² |

STIGMAFLEX® TK-K and STIGMAFLEX® EL-K pipes with diameters from 110 mm to 200 mm are produced in bars of standard length 6 m. In addition, pipes with diameters from 40 mm to 200 mm, are also produced in coils (standard length 50 m). That represents an additional advantage as it is simplified to change direction and avoid objects appearing on the pipeline route. Subsequently that means cheaper and faster pipe installation and easier pipe connection.

## STIGMAFLEX® TK PIPES MADE OF PE-HD

for protection of telecommunication cables

Pipes are manufactured in accordance with STS-06/047 and meet the requirements of applicable regulations and standards currently in force in the territory of the Republic of Slovenia, as well as meet the requirements for the use of telecommunications equipment and materials in the Telekom Slovenije network.

The standard color for the outer profiled wall of the pipe in coils is yellow, and black for pipes in 6m bars. Due to technical regulations, yellow marking lines on the perimeter of the pipe are used to mark the purpose.

The marking lines are made by the coextrusion process, so the marking remains permanent. For the needs of Telekom Slovenije, the tube or marking line on the tube is orange. Other colors are not excluded from the production program and depend on the customer's wishes and quantity.

## STIGMAFLEX® EL pipes made of PE-HD

for protection of power cables

Pipes are manufactured in accordance with STS-06/048 and meet the requirements of applicable regulations and standards currently in force in the territory of the Republic of Slovenia.

The standard color for the exterior profiled wall of pipes in coils and bars is red.  For greater protection against the effects of UV rays, we also produce black pipes, which are more durable than pipes of other colors. To properly mark black pipes, we use colored marking lines that are on the perimeter of the pipe. The marking lines are made by the coextrusion process, so the marking remains permanent.

Other colors are not excluded from the production program and depend on the customer's wishes and quantity.

# Dimensions of reels

**STIGMAFLEX® TK-K and STIGMAFLEX® EL-K pipes are supplied wound in coils with the following dimensions:**

| Nominal diameter DN (mm) | Length of pipe in reel (m) | Outer diameter of the reel (cm) | Inner diameter of the reel (cm) | Width of the reel (cm) |
|---|---|---|---|---|
| 40 | 50 | 90 | 65 | 30 |
| 50 | 50 | 100 | 65 | 30 |
| 63 | 50 | 110 | 65 | 35 |
| 75 | 50 | 120 | 65 | 40 |
| 90 | 50 | 130 | 65 | 45 |
| 110 | 50 | 150 | 65 | 55 |
| 125 | 50 | 160 | 65 | 65 |
| 160 | 50 | 200 | 100 | 70 |
| 200 | 40 | 220 | 100 | 90 |

# Dimensions of bars

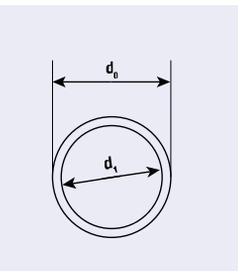
| Nominal diameter DN (mm) | | | 110 | 125 | 160 | 200 |
|---|---|---|---|---|---|---|
| pipe length (m) | 4 | total length of pipes per pallet | 76 | 60 | 33 | 20 |
| | | number of pipes per pallet | 304 | 240 | 132 | 80 |
| | 6 | number of pipes per pallet | 76 | 60 | 33 | 20 |
| | | total length of pipes per pallet | 456 | 360 | 198 | 120 |

# Production program

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 wall, in addition to additional security, allows easy installation of cables.

An auxiliary wire can also be inserted in the STIGMAFLEX® TK-K and STIGMAFLEX® EL-K pipes in coils on request. The wire is intended only for the introduction of a supporting rope, which later allows the retraction of telecommunication cables.

| Nominal diameter DN (mm) | Outer diameter $d_0$ (mm) | Inner diameter $d_1$ (mm) |
|---|---|---|
| 40 | 40 | 32 |
| 50 | 50 | 44 |
| 63 | 63 | 52 |
| 75 | 75 | 64 |
| 90 | 90 | 77 |
| 110 | 110 | 95 |
| 125 | 125 | 107 |
| 160 | 160 | 136 |
| 200 | 200 | 176 |




# Pipe Connection

Pipes and various connecting pieces are joined quickly and easily by inserting pipes into the clamp of the connecting piece. The joining technology enables minimal consumption of time and effort and ensures that the joints of pipes and joints of connecting pieces do not allow the intrusion of sand and other soil particles. In case when water tightness is required, a rubber sealing ring must be inserted into the groove between the second and third rib from the end of the pipe.

Prior to joining pipes and fittings, the contact surfaces must be clean and undamaged. If the required pipe length is shorter than the standard one, cut the pipe straight (with a knife or a fine-toothed saw). The plug end is pushed into the clamp to the limit. If the joints are made with sealing rings, the seal and the clamp must be lubricated with a suitable anti-friction agent (grease for rubber seals, silicone oil, soap), which must not damage the seal or pipe.

Due to connection with couplings, there is very little waste of pipes, as practically all lengths are usable.

**Couplings and accessories:**

| | | *Nominal diameter* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| accessories | | *40* | *50* | *63* | *75* | *90* | *110* | *125* | *160* | *200* |
| clutch | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| arc 90° | | | ● | ● | ● | ● | ● | ● | ● | |
| arc 45° | | | ● | ● | ● | ● | ● | ● | ● | |
| protective cover | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| distančnik | for 8 pipe | | ● | ● | ● | ● | ● | ● | ● | |
| | for 4 pipe | | | | | | ● | | | |
| rubber seal | | ● | ● | ● | ● | ● | ● | ● | ● | ● |

# Transport and storage

STIGMAFLEX® PE-HD pipes, due to their high resistance to wear and impact and low weight, enable easy 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 handling is required. Special attention should be paid to sharp objects and edges that can permanently damage the pipe. Therefore, it is necessary to clean the means of transport and storage areas with sharp objects and protect the 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 palletized 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, the pipe must not be pulled over sharp edges or on the ground. We recommend the use of suitable tools, such as lifting straps.

STIGMAFLEX® pipes in the form of bars are packed in pallets with wooden frames as follows:

| Nominal diameter DN (mm) | | | 110 | 125 | 160 | 200 |
|---|---|---|---|---|---|---|
| pipe length (m) | 4 | number of pipes per pallet | 76 | 60 | 33 | 20 |
| | | total length of pipes per pallet | 304 | 240 | 132 | 80 |
| | 6 | number of pipes per pallet | 76 | 60 | 33 | 20 |
| | | total length of pipes per pallet | 456 | 360 | 198 | 120 |

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.

# Quality Assurance

STIGMAFLEX® TK pipes are manufactured and tested in accordance with the applicable regulations for the use of telecommunications equipment and materials in the telecommunications network, as defined by Telekom Slovenije.

The pipes also meet the requirements of STS-06/047.

STIGMAFLEX® EL pipes are manufactured in accordance with STS-06/048. In the manufacturing process, the applicable regulations and valid standards are observed. STIGMAFLEX® requires continuous pipe inspection:

**in the production process:**

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

**and regular testing:**

- melt flow rate peak
- stiffness of the pipe (shape stability)
- impact resistance of pipe
- tightness of pipe joints and joint pieces

Control and testing of both input materials and finished products is continuously performed 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, the STIGMAFLEX® pipes obtained all certification approvals from competent institutions as evidenced by the issued test reports.

# 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.

## Installation procedure

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 Dpr> = 95%) next to 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 overlap is less than 0.8 m, it is necessary to take care of load distribution (eg by concreting).

When laying in a multi-layer pipe trench, it is recommended that the pipes be fixed with spacers, and it must be ensured that each layer of pipe is separately backfilled and hardened before the next layer is laid on it.

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.

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