OPTIFLEX®

Technical manual

HDPE Conduit for underground cable protection

Kanaflex®
BRAZIL

1. INTRODUCTION

Optilex is a conduit manufactured with HDPE (high density polyethylene) by extrusion process, with a smooth outside surface and longitudinal ribs on the inside. It can be supplied in several colors, with or without a stripe.

The main application is for cable protection in underground installations of Optical Fiber, Telecommunication and Power cables.

Figure 1

2. TECHNICAL CHARACTERISTICS

2.1. Feedstock

2.1.1. Polyethylene (PE)

Polyethylene is a plastic obtained by the union of numerous ethylene molecules (monomers), through the polymerization reaction in the presence of catalysts and under certain conditions of temperature and pressure, generating a macromolecule, which in turn, gives this material the characteristics typical of a polymer.

Polymers are made up solely of carbon and hydrogen (hydrocarbons) and are classified as polyolefins.

Polyethylene is the polyolefin that has the simplest molecular structure and is the most used plastic in the world.

Among the advantages of PE, we can highlight:

- lightness;
- excellent resistance to chemicals;
- excellent elasticity;
- high resistance to abrasion;

- high impact resistance, even at low temperatures;
- great resistance to loads and a high degree of safety against soil sedimentation;
- low coefficient of friction between conduit and cable;
- completely eliminates the need for concrete wrapping along the lines.

2.1.2. Types of PE (Polyethylene)

PE is notable for its extensive density range and according to this property it can be divided into:

High density polyethylene	HDPE
Medium Density Polyethylene	MDPE
Low Density Polyethylene	LDPE

The polyethylene used to manufacture conduits has a typical density value of approximately 0.95 g/cm³.

Due to this characteristic and combined with the smooth structure of the conduits, the final product is light when compared to equivalent products manufactured with other types of materials.

2.1.3. PE Chemical Resistance

Polyethylene has a non-polar structure similar to paraffinic hydrocarbons and for this reason, this polymer has excellent resistance to chemical products.

PE is resistant to aqueous salt solutions, diluted acids and alkalis. Only strong oxidizing agents such as highly concentrated peroxides, acids or halogens attack PE after a prolonged period of exposure.

This resistance does not, exclude the possibility that under certain conditions, the mechanical properties of polyethylene may be influenced by the action of chemical compounds.

For more specific and detailed information, we recommend consulting the ISO/TR 10358 standard "*Plastics pipes and fittings – Combined chemicals – resistance classification table*".

Some generic information about the chemical resistance of Polyethylene is shown in table 1.

PRODUCT	Temperature		PRODUCT	Temperature	
	20°C	60°C		20 °C	60 °C
LEAD ACETATE	E	E	SODIUM CHLORIDE	E	E
ACETONE 100%	E	E,D	ZINC CHLORIDE	E	E
GLACIAL ACETIC ACID	E	G,D,c,f	CHLORINE (GAS AND LIQUID)	F	N
HYDROCYANIC ACID	E	E	CHLOROBENZENE	G	F,D,d,c
HYDROBROMIC ACID	E	E	CHLOROFORM	G	F,D,d,c
CARBONIC ACID	E	E	DETERGENTS	E	E,c
CARBOXYLIC ACID	E	E	DICHLOROBENZENE	F	F
HYDROCHLORIC ACID	E	E,d	DIOCTYL PHTHALATE	E	G,c
CHLOROSULFONIC ACID	F	N	LIQUID SULFUR DIOXIDE	F	N
CHROMIC ACID 80%	E	F,D	SULFUR	E	E
HYDROFLUORIC ACID 1-75%	E	E	ESSENCE OF TURPENTINE	G	G
PHOSPHORIC ACID 30-90%	E	G,D	ALIPHATIC ESTERS	E	G
GLYCOLIC ACID 55-70%	E	E	ETHER	G	F
NITRIC ACID 50%	G,D	F,D,f	PETROLEUM ETHER	G,d,i	F,d
NITRIC ACID 95%	N,F,f	N,c	FLUORIDE	G	N
PERCHLORIC ACID 70%	E	F,D	GASOLINE	E	G,c
SALICYLIC ACID	E	E	AMMONIA HYDROXIDE 30%	E	E
SULFOCHROMIC ACID 80%	F	F,f	POTASSIUM HYDROXIDE CONC.	E	E,c
SULFURIC ACID 50%	E	E	SODIUM HYDROXIDE CONC.	E	E,c
SULFURIC ACID 98%	G,D	F,D,f	SAT. CALCIUM HYPOCHLORITE	E	E
SULFUROUS ACID 50%	E	E	SODIUM HYPOCHLORITE 15%	E	E,D,d
TARTARIC ACID	E	E	ISOOCTANE	G	G
TRICHLOROACETIC ACID 50%	E	E	METHYL ETHYL KETONE	E	F
TRICHLOROACETIC ACID 100%	E	F	NAPHTHA	E	G
ACRYLONITRILE	E	E	SATURATED AMMONIA NITRATE	E	E
SEA WATER	E	E	SILVER NITRATE	E	E
BENZYL ALCOHOL	E	E	SODIUM NITRATE	E	E
BUTYL ALCOHOL	E	E	NITROBENZENE	F	N,c
ETHYL ALCOHOL 96%	E	E	FUEL OIL	E	F
METHYL ALCOHOL	E	E	DIESEL	E	G
AMMONIA	E,D,d	E,D,d	PHOSPHOROUS PENTOXIDE	E	E
ACETIC ANHYDROUS ALCOHOL	E	G,D	POTASSIUM PERMANGANATE	D,E	E
ANILINE	E	G	HYDROGEN PEROXIDE 30%	E	E,d
BENZENE	G,d	G,d,i	OIL	E	G
SODIUM BENZOATE	E	E	KEROSENE	G	G,c
POTASSIUM DICHROMATE 40%	E	E,D	NICKEL SALTS	E	E
SODIUM BORATE	E	E	METAL SULFATES	E	E
WHITENERS	E	G,c	SODIUM SULFATE	E	G
LIQUID BROMINE	F	N	CARBON TETRACHLORIDE	G,d,i	F,d,c
SODIUM CARBONATE	E	E	TRICHLOROETHYLENE	F,D	N,D
AMMONIA CHLORIDE	E	E	XYLENE (XYLOL)	G,d,i	F,c,d

***Table 1**: PE Chemical Resistance*

CAPTION

D – Discoloration.
E – Exposure for 30 days, without loss of characteristics, able to tolerate contact for many years.
F – Some signs of attack after 7 days in contact with the product.
G—Slight absorption after 30 days of exposure, without compromising mechanical properties.
N - Not recommended. Detected signs of attack within minutes to hours, after beginning exposed.
c – Shearing.
d – Deformation.
f – Fragilization.
i – Swelling.

2.1.4. PE Abrasion Resistance

Polyethylene has high resistance to abrasion, much higher when compared to other conventional materials used in the manufacture of pipes for infrastructure applications.

To evaluate this property, a test method was developed, which became known as the Darmstadt Abrasion Test, standardized in DIN 19534. Samples of pipes made of different materials were subjected to the same abrasion test and the results found are shown in the graph in figure 2.

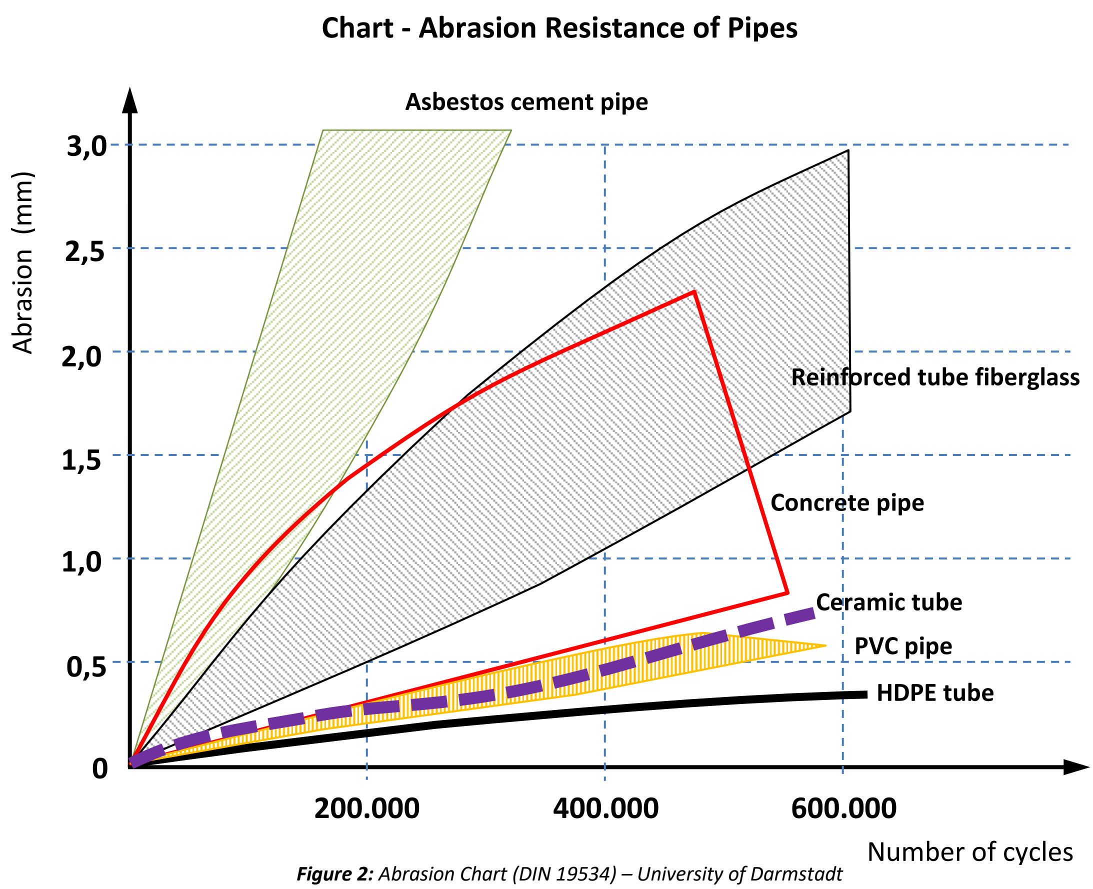

Figure 2: *Abrasion Chart (DIN 19534) – University of Darmstadt*

2.1.5. PE Flexibility

Polyethylene is a ductile material with excellent resistance to elongation at break, which allows pipes made with this material to deform with soil movement without breaking or cracking.

The polyethylenes used to manufacture conduits have typical values of resistance to elongation at break above 500% and an elastic modulus of around 800 MPa.

2.2. Specifications

Optilex is a conduit made of HDPE (High Density Polyethylene), with an excellent radius of curvature, used for protection and conduction of underground cables.

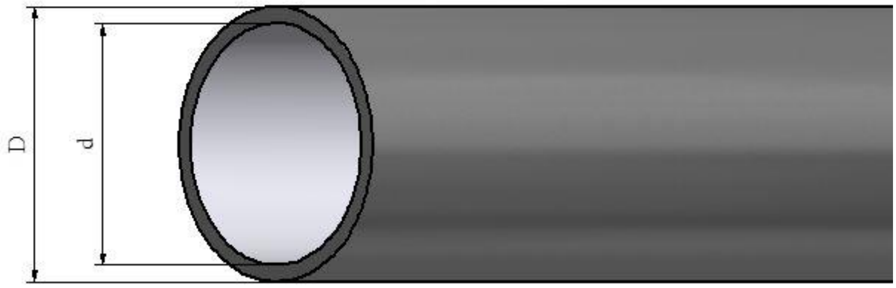

Figure 3

Nominal Diameter	SDR Schedule	OD Outside Diameter		Wall Thickness	
		Inches Min.	Tolerance	Inches Min.	Tolerance
1/2"	SDR 9	0,840	± 0,004	0.093	+0.020
	SDR 11	0,840	± 0,004	0.076	+0.020
	SDR 13.5	0,840	± 0,004	0.062	+0.020
	DR 15.5	0,840	± 0,004	0.062	+0.020
	Schedule 40	0,840	± 0,004	0.109	+0.020
	Schedule 80	0,840	± 0,004	0.147	+0.020
3/4"	SDR 9	1,050	± 0,005	0.117	+0.020
	SDR 11	1,050	± 0,005	0.095	+0.020
	SDR 13.5	1,050	± 0,005	0.078	+0.020
	DR 15.5	1,050	± 0,005	0.068	+0.020
	Schedule 40	1,050	± 0,005	0.113	+0.020
	Schedule 80	1,050	± 0,005	0.154	+0.020
1"	SDR 9	1,315	± 0,007	0.146	+0.020

	SDR 11	1,315	± 0,007	0.120	+0.020
	SDR 13.5	1,315	± 0,007	0.097	+0.020
	DR 15.5	1,315	± 0,007	0.084	+0.020
	Schedule 40	1,315	± 0,007	0.133	+0.020
	Schedule 80	1,315	± 0,007	0.179	+0.021
1.1/4"	SDR 9	1,660	± 0,008	0.184	+0.022
	SDR 11	1,660	± 0,008	0.151	+0.020
	SDR 13.5	1,660	± 0,008	0.123	+0.020
	DR 15.5	1,660	± 0,008	0.107	+0.020
	Schedule 40	1,660	± 0,008	0.140	+0.020
	Schedule 80	1,660	± 0,008	0.191	+0.023
1.1/2"	SDR 9	1,900	± 0,010	0.211	+0.025
	SDR 11	1,900	± 0,010	0.173	+0.021
	SDR 13.5	1,900	± 0,010	0.141	+0.020
	DR 15.5	1,900	± 0,010	0.123	+0.020
	Schedule 40	1,900	± 0,010	0.145	+0.020
	Schedule 80	1,900	± 0,010	0.200	+0.024
2"	SDR 9	2,375	± 0,012	0.264	+0.032
	SDR 11	2,375	± 0,012	0.216	+0.026
	SDR 13.5	2,375	± 0,012	0.176	+0.020
	DR 15.5	2,375	± 0,012	0.153	+0.020
	Schedule 40	2,375	± 0,012	0.154	+0.020
	Schedule 80	2,375	± 0,012	0.218	+0.026
2.1/2”	SDR 9	2,875	± 0,014	0.319	+0.038
	SDR 11	2,875	± 0,014	0.261	+0.031
	SDR 13.5	2,875	± 0,014	0.213	+0.020

	DR 15.5	2,875	± 0,014	0.185	+0.022
	Schedule 40	2,875	± 0,014	0.203	+0.024
	Schedule 80	2,875	± 0,014	0.276	+0.033
3"	SDR 9	3,500	± 0,018	0.389	+0.047
	SDR 11	3,500	± 0,018	0.318	+0.038
	SDR 13.5	3,500	± 0,018	0.259	+0.031
	DR 15.5	3,500	± 0,018	0.226	+0.027
	Schedule 40	3,500	± 0,018	0.216	+0.026
	Schedule 80	3,500	± 0,018	0.300	+0.036
4"	SDR 9	4,500	± 0,023	0.500	+0.060
	SDR 11	4,500	± 0,023	0.409	+0.049
	SDR 13.5	4,500	± 0,023	0.333	+0.040
	DR 15.5	4,500	± 0,023	0.290	+0.035
	Schedule 40	4,500	± 0,023	0.237	+0.028
	Schedule 80	4,500	± 0,023	0.337	+0.040
5"	SDR 9	5,563	± 0,028	0.618	+0.074
	SDR 11	5,563	± 0,028	0.506	+0.061
	SDR 13.5	5,563	± 0,028	0.412	+0.049
	DR 15.5	5,563	± 0,028	0.359	+0.043
	Schedule 40	5,563	± 0,028	0.258	+0.031
	Schedule 80	5,563	± 0,028	0.375	+0.045
6"	SDR 9	6,625	± 0,033	0.736	+0.088
	SDR 11	6,625	± 0,033	0.602	+0.072
	SDR 13.5	6,625	± 0,033	0.491	+0.059
	DR 15.5	6,625	± 0,033	0.427	+0.051
	Schedule 40	6,625	± 0,033	0.280	+0.034

	Schedule 80	**6,625**	**± 0,033**	**0.432**	**+0.05**
8"	**SDR 9**	**8,625**	**± 0,043**	**0.958**	**+0.115**
	SDR 11	**8,625**	**± 0,043**	**0.784**	**+0.094**
	SDR 13.5	**8,625**	**± 0,043**	**0.639**	**+0.077**
	DR 15.5	**8,625**	**± 0,043**	**---**	**---**
	Schedule 40	**8,625**	**± 0,043**	**---**	**---**
	Schedule 80	**8,625**	**± 0,043**	**---**	**---**
10"	**SDR 9**	**10,750**	**± 0,054**	**1.194**	**+0.143**
	SDR 11	**10,750**	**± 0,054**	**0.977**	**+0.117**
	SDR 13.5	**10,750**	**± 0,054**	**0.796**	**+0.096**
	DR 15.5	**10,750**	**± 0,054**	**---**	**---**
	Schedule 40	**10,750**	**± 0,054**	**---**	**---**
	Schedule 80	**10,750**	**± 0,054**	**---**	**---**
12"	**SDR 9**	**12,750**	**± 0,064**	**1.417**	**+0.170**
	SDR 11	**12,750**	**± 0,064**	**1.159**	**+0.139**
	SDR 13.5	**12,750**	**± 0,064**	**0.944**	**+0.113**
	DR 15.5	**12,750**	**± 0,064**	**---**	**---**
	Schedule 40	**12,750**	**± 0,064**	**---**	**---**
	Schedule 80	**12,750**	**± 0,064**	**---**	**---**

***Table 2** – Measurement chart*

The minimum radius of curvature of Optilex is 20 times their external diameter.

3. INSTALLATION

3.1. Trench preparation

When installing buried pipes, the trench walls must be vertical.

Its width and depth can be determined by the diameter of the conduit to be installed or by the type of duct bank to be constructed and the distance between them horizontally and vertically.

The backfill height must be at least 2’ measured from the top of conduits to the surface of the asphalt layer or ground level and, in cases where the load level is very high, this may vary up to 4’.

If the bottom of the trench is made of rocky or irregular material, apply a layer of sand or clean earth and compact it, thus ensuring the leveling and integrity of the conduits to be installed.

If there is water at the bottom of the trench, we recommend applying a layer of gravel covered with sand to drain it, in order to obtain good compaction.

3.2. Launching the Optilex into the trench

Before launching Optilex into the trench, the bottom of the trench must be leveled, compacted and clean without the presence of external agents, in order to prevent the product from being damaged during placement and compression.

3.3. Accommodation/settlement of the conduit inside the trench

a) **Structure of pipelines in land/sand**

The conduits do not require concrete enveloping, therefore, compaction between the lines must be carried out manually with earth or sand with a minimum thickness of 1.1/2” (dimension A).

From the last layer, fill every 1’ using a mechanical compactor, making up level B.

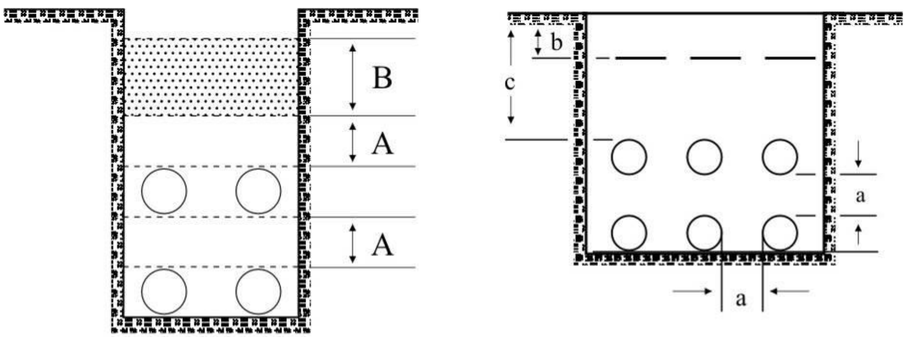

Figure 4

Load resistance

QUOTA	DISTANCE BETWEEN CONDUITS AND LOAD RESISTANCE FOR ANY PIPE
a	1.1/2”
b	The distance between the ground level and the warning tapes is 1’
c	Up to 20.0 tons. = 2’ Above 20.0 ton. = 3’

Table 3

The spacers help fill all empty spaces, thus preventing future sinking into the ground and/or movement of the pipeline bank during cable pulling.

The distances between spacers at curve or straight points must be 2’, to avoid the formation of curves and counter-curves along the line.

The spacers can be made of wooden dowels, pre-molded wooden or concrete ones, wooden or iron forks/combs, and can be removed after filling the voids and reused along the line.

To speed up performance and minimize installation costs for assembling the bank of conduits, we suggest the manufacture of spacers in wood or iron like COMB, removable along the line, as shown in the figure shown below.

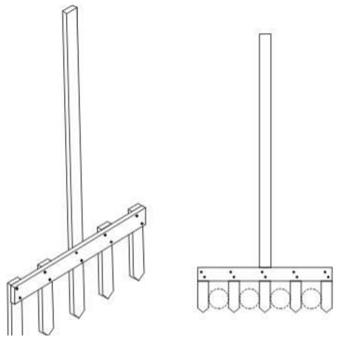

Figure 5

b) **Concrete conduit structure**

In the case of shallow trenches, that is, backfilling less than 2’ and with heavy and intense traffic on the surface, to avoid the concrete enveloping of the conduits, we suggest the placement of pre-molded concrete plates or a ballast of 4” of lean concrete, just below the danger warning tapes (see dimension “b” in Figure 4, Page 10).

c) **Grouped conduits**

For grouped conduits, they are launched directly into the trench, complying with a minimum backfill height of 2’ against external loads of up to 20 tons.

Figure 6

To avoid blocking the fiber optic cables inside the conduits, they must be aligned, spaced and without curves along the line.

The conduits are also recommended for installing fiber optic cables using the blowing method (using compressed air) in buried networks. In this type of process, it is possible to insert the fiber optic cable over distances of approximately 2.200yd, which considerably reduces the number of intermediate junction/inspection boxes, generating a large increase in productivity and a reduction in construction costs.

Due to the low coefficient of friction between the conduit and optical cable, the fiber can also be inserted using the traction method.

4. NON-DESTRUCTIVE METHOD (Trenchless)

The so-called non-destructive (Trenchless) installation methods have been increasingly used, both in the recovery of old lines and in the installation of new ones.
In large urban centers they already account for the majority of installations, due to their lesser intervention and disturbance to traffic and the population.

4.1 Horizontal Directional Drilling (HDD)

Basically used at street crossings or for installing new pipes without opening trenches, where economically convenient or when local conditions are decisive.
Nowadays it is one of the most used non-destructive methods.
Applies to pipes with lengths of up to 2.200yd, depending on the type of soil.

Figure 7

5. SPLICING OF CONDUITS

The importance of a well-executed splice aims to prevent the infiltration of liquids of any kind into the conduits, which will increase the useful life of the wires and cables contained therein.

5.1. Thermofusion welding splice

Thermofusion welding consists of subjecting products to a certain temperature and for a time such that the materials fuse.

Next, unite the molten surfaces under a certain pressure, causing interaction between the molten masses, so that they are cooled, resulting in a single body that maintains the same properties and characteristics of the original materials.

Thermofusion is the most traditional and widely used form of welding solid olefin pipes, being most commonly applied to pipes over 2.1/2" in diameter.

5.2. Splicing by electrofusion welding

Electrofusion welding differs from thermofusion, where the materials are heated by passing an electric current from a spiral resistance, incorporated into the part, generating heat for fusion.

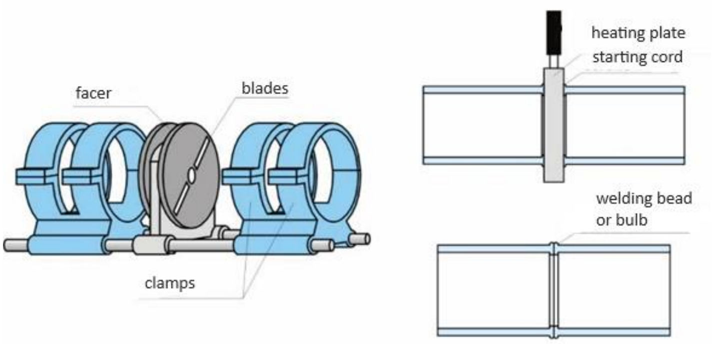

Figure 8

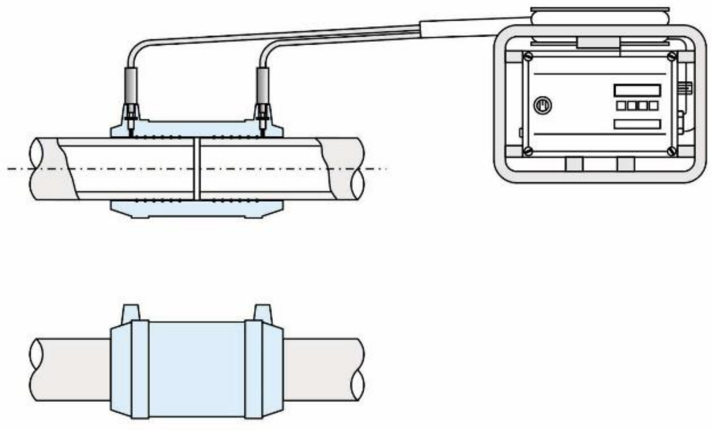

Figure 9

5.3. Splicing by mechanical joint

Numerous types of mechanical joint connections are available for PE conduits.

They are made of metal or plastic and have various applications.

Procedure to connect two Optilex conduit using mechanical joint:

- ***1st Step: bevel the tip of the conduit (scrape and remove the sharp corner of the tip);***
- ***2nd Step: at Connection, unscrew the cover without dismantling the assembly;***
- ***3rd Step: insert the conduit into the Connection until it finds the internal stop of the thrust ring;***
- ***4th Step: screw the cover completely onto the Connection body.***

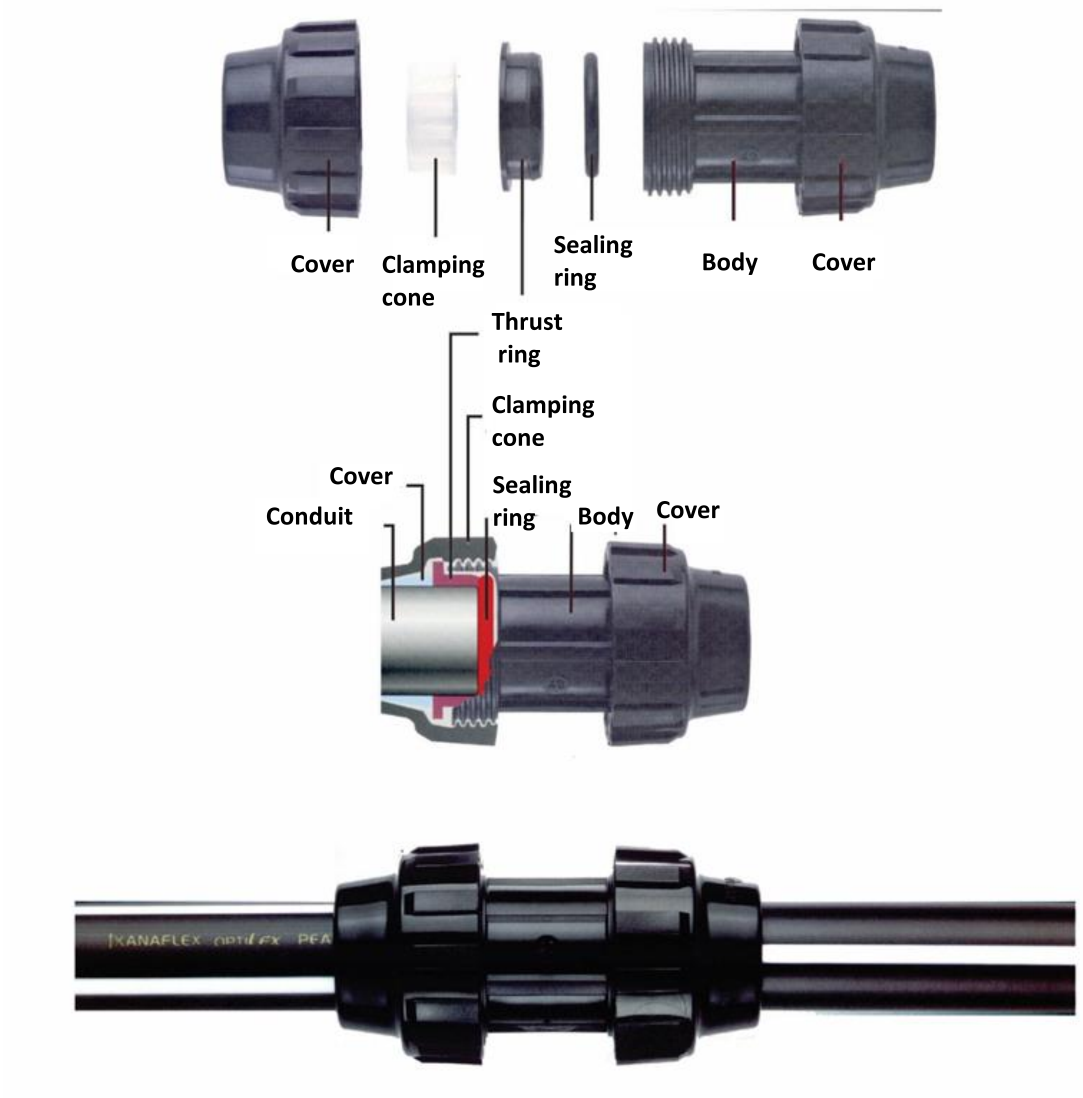

Figure 10

6. RECOMPOSITION OF THE FLOOR

The intermediate layers between the conduits must be compacted manually with a 1.1/2” layer of earth or sand, taking care to ensure that all empty spaces are filled. The vertical and horizontal distances between the conduits must be maintained, in accordance with what is established in the project. If the soil is excessively dry, moisten it sufficiently to allow adequate compaction. This process consists of releasing water into each layer of ducts and must be carried out with special care, so as not to cause the earth to flow and the conduits to float.

Compaction of the soil above the last layer of conduits must be carried out using a mechanical compactor of the “frog”, “pen” or “vibrating plate” type and in layers of a maximum of 8” thick.

When executing the last layer of compaction, at an approximate depth of 8” below ground level, place the warning tape over each conduit line.

7. MANHOLE ARRIVAL

Upon arrival at manhole, it is recommended that the conduits be covered in concrete, aiming for their parallelism and perpendicularity.
This concrete layer can be replaced with properly compacted earth or sand.
This procedure aims for perfect alignment of the conduits, forming a 90° angle in relation to the box wall, as shown in the figure below.

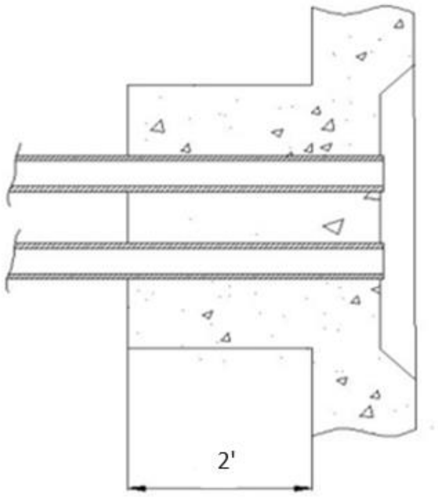

Figure 11

8. SHIELDING THE END OF THE CONDUITS

The conduits are completely waterproof and to prevent the penetration of liquids of any kind into them, after laying the cables, we carry out a process called shielding.

The objective is to prevent liquids from flowing between underground boxes or passing through the pipeline.

Shielding is carried out by filling the space between the cable and the conduit, placing a layer of tow forming a shield and thus preventing the material applied later from penetrating into the conduit.

The material used for shielding may be plaster, white cement, mortar, caulk or mastic.

9. PRECAUTIONS IN HANDLING/TRANSPORTATION

During the transportation and handling of conduits and accessories, shocks, friction or contact with elements that could compromise their integrity must be avoided, such as: metallic or sharp objects with sharp edges, stones, etc.

a) **Unloading:**

Unloading must be carried out carefully, not allowing the conduits to be launched directly to the ground, in order to avoid the concentration of loads at a single point.

OPTILEX IN ROLLS

After untying the load, follow the procedure below:

 *Figure 12*	 ***Figure 13***
If using a forklift, only 1 piece should be lifted at a time.	If using a munck truck, the strap must be properly secured before starting the lift.

OPTILEX ON SPOOLS

Figure 14

Do not move the reel by inserting the forks inside and leaning on the product.

Figure 15

Do not move the spool by passing the strap through the outer rings.

Figure 16

Do not move the reel by inserting the forks into the outer rings.

Never lift the reel by the rings

Figure 17

Handling must be carried out by supporting the forklift forks on the central beams of the reel.

If the spools are moved using a *Munck* or similar device, the lifting must be carried out through the center of the spool, passing a reinforced metal bar through the spool axis and attaching the strap to this bar.

OPTILEX IN BARS

The unloading of bars must be carried out using equipment that allows the group to be safely lifted and handled.

It must have a capacity that allows the products to be handled (check the weight on the invoice) and the bars must be stored in blocks as they are unloaded.

The *Munck* must have straps with a capacity that meets the weight of the product, using a guide man with ropes as shown in Figure 18.

***Figure 18** – Unloading smooth tubes into bars, with a munck truck and a guide man*

b) Storage:

The products must be stored in a place free from elements that could damage the products, such as: sharp metal objects (nails, screws); hard surfaces with sharp edges (broken wood, glass) etc.

When using wooden pallets, they must be in good condition, that is, free from visible nails, broken sheets, rotten wood, etc.

Black conduits must not be stored in locations subject to bad weather for a period longer than 12 months. For non-black conduits subject to weathering, it is recommended that the storage period does not exceed 6 months. If there is a need for longer storage periods, we recommend that the products be stored in covered places protected from sunlight or bad weather.

OPTILEX ON SPOOLS

The spools should preferably be stored parallel to each other, to facilitate their identification and shod with a wooden stump, to prevent them from rolling (Figure 19).

Figure 19 *– Locking the spools with a wooden stump.*

OPTILEX IN ROLLS

To avoid damage to products, rolls must not be placed directly on the floor. To protect them, use wooden pallets, plastic canvas, plywood sheets, rubberized flooring, among others.

The rolls must be stored in a vertical position, supporting each other, as shown in Figure 20.

Figure 20 *– Vertical Tube Storage (for DN 2.1/2" to 5").*

The rolls must be "locked" in order to prevent them from "slipping/sliding" and possible damage to the products. To do so, you can tie one roll to the others or use the "roll lock".

Figure 21 illustrates a "roller lock", which must be positioned below the rollers, avoiding direct contact with the ground and their "slipping/sliding".

Figure 21 *– Wooden "roller lock", which must be positioned below the rollers.*

The first roll, in addition to being on the "roll lock", must also be firmly supported on the specific metal supports for this purpose.
It is not recommended to support the rolls on walls, fire hydrants, buckets, winders, raw material racks, among others, as they are fragile structures that may not withstand the weight of the rolls.

OPTILEX IN BARS

The bars must be accommodated in "blocks" with properly locked battens.
The "Blocks" must be prepared according to the instructions below:

 ***Figure 22***	 ***Figure 23***
Distribute 4 boards for 39' bars and 3 boards for 19' bars, with triangular wedges at the ends spacing them evenly.	Position the conduits on the wooden planks, taking care to place the first bar against the triangular wedge.

Figure 24

Complete the layer with as many tubes as possible. BE CAREFUL not to leave the bars resting on the wedges.

Figure 25

When completing the layer, pass 2 straps evenly distributed across the bars.

Figure 26

Repeat the previous steps up to the limit of 10’ in height, or until the weight of the crate reaches 3,000lb. Finally, pass 2 straps around the entire crate.

The maximum stacking limit for conduits in bars is 10’ high.
Do not store larger diameter bars over smaller diameter tubes.
For movement with munck, a minimum load capacity of 5,500lb must be considered; and the straps that will carry out the lifting must have a minimum capacity of 4,400lb.

10. FINAL INSPECTION


Certificado de Conformidade 01321/13

Cliente:

The final evaluation includes checking that each product's requirements are met, according to its codes, descriptions and marking.

A Certificate of Conformity is issued for each batch of product, containing the complete description, invoice, regulatory standard and compliance with the main requirements assessed.

1) Kanaflex's principle is the continuous improvement of its products.
Any changes may be made to this technical manual, without prior notice, with the aim of improving it.

2) This technical manual is intended to help Optilex users with their plumbing work.
If there is any question or particularity not covered in this manual, please contact our Technical Support Department.

3) Kanaflex provides technical assistance services on construction sites. This service aims to guide installers on the correct specifications for installing the pipe and cannot be considered an inspection. Our technicians is instructed not to interfere in Engineering and Design, which are the responsibility of contractors and installers.

Questions or suggestions?
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