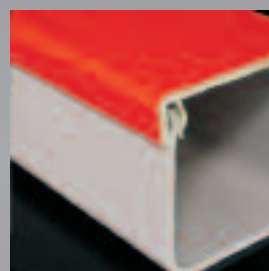
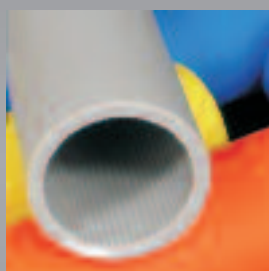
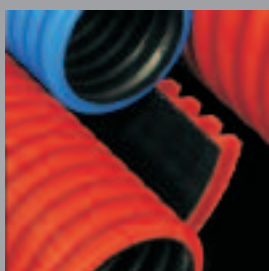




2012

## CABLE PROTECTION DUCTS





### Over 85 of electro-installation and material production stowage

The beginning of electrotechnic production of KOPOS KOLÍN goes back to the year 1926. Even before the WWII the company reached monopolistic status among keen competition on domestic market. After war the assortment changed slightly to match political needs.

Starting from 1994, new management of the company started with intense investments and development program. To ensure enough of quality raw material, the company has built its own PVC mixture production facility. The peak of the modernization process with regards to the quick growth of the company and its high logistics demands occurred in the year of 2005 and in 2008 there were opened two new storage and administrative production halls.

Within the innovation processes the company progressively introduces a new way of producing the technical documentation and a lot of modern technologies. A lot of new products were introduced, e.g. series of electroinstallation laths, double-coated corrugated pipes, double-coated parapet culverts, lead-free products or wide range of halogen-free products. There are 5000 kinds of products up today in the assortment of KOPOS KOLÍN.

The company's number one production priority is the quality of products. New products are always adjusted to match the EU standard requirements and all the assortment is traditionally tested according requirements of harmonized electrotechnic standards.

KOPOS KOLÍN a.s. is a holder of the certificate ISO 9001 and ISO 14001 as well as the Safe company and the Czech quality certificates. The company provides 100% guarantee on keeping the process stability, and consequently on the quality and safety of the products.

The company is always ready to match increased needs of the market and this helps to keep its permanent leading position. It can be considered a significant success that in the recent years KOPOS KOLÍN a.s. opened up 13 daughter sales companies mainly in Easter Europe, but also in Asia and in Africa, and it evolved from a domestic supplier to a company with a share in the world's market.

**The most important man in KOPOS KOLÍN is always the customer.**

**THANK YOU FOR YOUR PARTNERSHIP**



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Corrugated double-wall cable ducts KOPOFLEX® and KOPODUR®



The duct system KOPOFLEX® and KOPODUR® offers a wide range of applicability. It is particularly suitable for the mechanical protection of all kinds of power and telecommunication cables.

**Benefits of double-wall cable ducts compared to other duct types:**

**Benefits of the materials used:**

- polyethylene, the material of the ducts, offers high resistance to aggressive substances
- possible use in the chemical industry
- halogen-free material
- suitable for the protection of water pipes
- different colours
- possible design with high UV stability
- the zero content of asbestos protects human health



**Benefits of the unique method of production of double-wall ducts:**



- the double wall and the corrugated shape provide high resistance under compression
- possible change of description on the pipe
- easy handling with the ducts when loading and re-loading



**KOPOFLEX® - high flexibility**



**KOPODUR® - high rigidity**



**Installation benefits:**



- can be installed directly in the soil, with no need of a sand bed

- possible installation directly in concrete

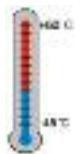
- a slip-over coupling seals the duct joint on IP 40

- sealing rings fitted on both ends of the duct protect the joint against humidity and temporary flooding with water (IP 67)

- well-arranged installation in multiple layers and rows thanks to distance spaces

- broad temperature range for application

- when installing, it is advisable to use at least 1 empty extra pipe in case that additional cables are needed in future



**Benefits for inserting cables:**

- the slight wall corrugation allows easy cable insertion and reduces friction by up to 30%
- the smooth inner surface (compared to concrete pipes) eliminates the possibility of cable damage
- a pull-through string ensures easy cable insertion







Icons - capture

- material
- temperature resistance, scope of application (°C)
- flammability class of construction material
- mechanical resistance / load limit value(N)
- limit of compression strength (kPa)
- package (m / kg; pcs / kg)
- package dimensions (cm)
- outside diameter (mm)






- inside diameter (mm)
- length (mm, m)
- dimensions - width, height (mm)
- dimensions - width (mm)
- dimensions - inner width (mm)
- dimensions - height (mm)
- dimensions - inner height (mm)
- minimum bending radius (mm)



**KOPOFLEX®** - flexible corrugated double-wall cable ducts





			
>450 N / 20 cm	HDPE <b>halogen-free</b> not self-snuffing	storage, permanent installation: -45 - + 60 °C assembly: -5 - + 60 °C	A

conf.	description
B...	color: red
C...	color: blue
E...	color: yellow
F...	color: black
...A	package: 50 m
...B	package: 25 m






	configuration									kg
	BA	CA	EA	FA	mm	mm	mm	cm	m	
<b>KF 09040</b>	BA	CA	EA	FA	40	32	230	65 x 30	50	5,4
	-	CB	-	-				50 x 15	25	2,7
<b>KF 09050</b>	BA	CA	EA	FA	50	41	350	90 x 30	50	8,1
	-	CB	-	-				80 x 20	25	4,0
<b>KF 09063</b>	BA	CA	EA	FA	63	52	350	95 x 35	50	12,1
	-	CB	-	-				85 x 30	25	6,1
<b>KF 09075</b>	BA	CA	EA	FA	75	61	350	100 x 45	50	15,7
	-	CB	-	-				105 x 30	25	7,8
<b>KF 09090</b>	BA	CA	-	FA	90	75	400	110 x 45	50	20,5
<b>KF 09110</b>	BA	CA	EA	FA	110	94	400	115 x 65	50	25,4
	BB	CB	-	-				120 x 40	25	12,7
<b>KF 09120</b>	BA	-	-	-	120	100	500	150 x 50	50	35,0
<b>KF 09125</b>	BA	-	-	-	125	108	500	150 x 60	50	39,0
<b>KF 09160</b>	BA	CA	-	FA	160	136	650	160 x 80	50	50,0
	BB	CB			160	136	650	160 x 45	25	25,0
<b>KF 09175</b>	BA	-	-	FA	175	150	700	200 x 65	50	64,0
<b>KF 09200</b>	BB	-	-	FB	200	172	850	170 x 75	25	33,8



**KOPOFLEX®** - UV-stabilized flexible corrugated double-wall cable ducts

			
>450 N / 20 cm	HDPE <b>halogen-free</b> not self-snuffing	storage, permanent installation: -45 - + 60 °C assembly: -5 - + 60 °C	A

conf.	description
UV...	UV-stabilized
...B...	color: red
...C...	color: blue
...F...	color: black
...A	package: 50 m

	configuration								kg
	UVBA	UVCA	UVFA	mm	mm	mm	cm	m	
<b>KF 09040</b>	UVBA	UVCA	UVFA	40	32	230	65 x 30	50	5,3
<b>KF 09050</b>	UVBA	UVCA	UVFA	50	41	350	90 x 30	50	8,1
<b>KF 09063</b>	UVBA	UVCA	UVFA	63	52	350	90 x 40	50	12,1
<b>KF 09075</b>	UVBA	UVCA	UVFA	75	61	350	100 x 45	50	15,7
<b>KF 09090</b>	UVBA	UVCA	UVFA	90	75	400	110 x 45	50	20,5
<b>KF 09110</b>	UVBA	UVCA	UVFA	110	94	400	115 x 70	50	25,4
<b>KF 09160</b>	UVBA	UVCA	UVFA	160	136	650	160 x 80	50	50,0



**KOPODUR®** - rigid corrugated double-wall cable ducts

>450 N / 20 cm	HDPE <b>halogen-free</b> not self-snuffing	storage, permanent installation: -45 - + 60 °C assembly: -5 - + 60 °C	A

conf.	description
B...	color: red
C...	color: blue
F...	color: black
...A	package: 6 m (3 m)
...C	package: 6 m

KD	configuration	mm	mm	m	cm	m	kg
<b>KD 09040</b>	BC - -	40	32	6	45 x 45 x 605	432	116
<b>KD 09050</b>	BC CC FC	50	41	6	82 x 66 x 605	360	119
<b>KD 09063</b>	BC - -	63	52	6	80 x 52 x 605	312	135
<b>KD 09075</b>	BC CC -	75	61	6	104 x 88 x 607	312	126
<b>KD 09090</b>	BC CC FC	90	75	6	120 x 76 x 607	312	185
<b>KD 09110</b>	BC - -	110	94	6	112 x 95 x 610	462	336
	- CC FC				77 x 57 x 610	216	163
	- - FA				107 x 86 x 310	231	168
<b>KD 09120</b>	BC - -	120	100	6	112 x 128 x 610	612	459
<b>KD 09125</b>	BC - -	125	108	6	112 x 71 x 610	306	220
	BA CC -				112 x 71 x 610	288	207
<b>KD 09160</b>	BC CC FC	160	136	6	117 x 83 x 610	198	251
<b>KD 09175</b>	BA - -	175	150	6	108 x 126 x 615	306	392
<b>KD 09200</b>	BC - -	200	175	6	122 x 74 x 615	120	178

**Accessories for corrugated ducts KOPOFLEX® and KOPODUR®**

**Couplings** - slip-over couplings are the same for both types of pipes and are used to join the pipes.

**Sealing rings** - the same for both types of pipes and are used to seal the joint to prevent it against humidity and water.

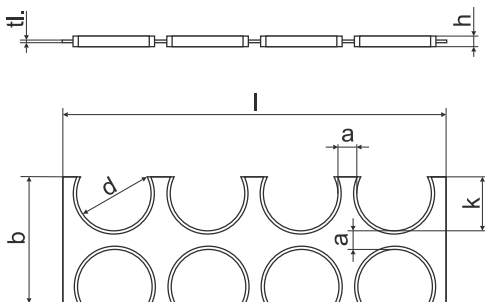
**Closing plugs** - for blinding of backup lines and for temporary blinding of pipes when installing.

**90° elbows** - rigid elbows for joining pipes in 90° angle. Per order only.

**45° elbows** - rigid elbows for joining pipes in 45° angle. Per order only.

**Distance spacers** - for position fixation of several pipes in one excavation. Distance spacers are for fixation 8 pipes and spacer can be split for fixation 2, 4 and 6 pipes. Per order only.

pipes mm	coupling	sealing ring	closing plug	elbow			distance spacer
				90°	45°		
40	02040	16040	17040				
50	02050	16050	17050	08050/90	08050/45	350	07050/8
63	02063	16063	17063	08063/90	08063/45	350	07063/8
75	02075	16075	17075	08075/90	08075/45	350	07075/8
90	02090	16090	17090	08090/90	08090/45	400	07090/8
110	02110	16110	17110	08110/90	08110/45	400	07110/8
120	02120	16120	17120	08120/90	08120/45	500	
125	02125	16125	17125	08125/90	08125/45	500	07125/8
160	02160	16160	17160	08160/90	08160/45	650	07160/8
175	02175	16175	17175	08175/90	08175/45	700	
200	02200	16200	17200	08200/90	08200/45	850	07200/8



distance spacer	distance	height	fixing width	fixing height	material thickness	total width	total width after opening		
	a	b	h	k	tl.	l (8x)	l (2x)	l (4x)	l (6x)
<b>07050/8</b>	30	97	12	34	2,5	328	80	160	240
<b>07063/8</b>	30	116	12	43	2,5	381	95	190	280
<b>07075/8</b>	25	125	12	50	2,5	408	105	208	305
<b>07090/8</b>	28	148	14	60	2,5	482	125	247	360
<b>07110/8</b>	30	190	15	80	3	568	142	284	426
<b>07125/8</b>	38	210	20	88	3	658	175	336	497
<b>07160/8</b>	60	270	25	107	5	885	225	450	665
<b>07200/8</b>	80	345	25	133	5	1135	287	575	847

HDPE communication cable ducts



Single-wall protection ducts for fibre-optic and metallic cables.

As requested by the customer:

Colour strips facilitate cable identification when several protection ducts are installed in a single excavation.



The shape of longitudinal grooves ensures easier air-blown installation of cables.



The ducts can be also supplied with the inner surface treated with a special type of oil. This treatment provides another advantage for easier cable installation.



The ducts can be provided with text (including length indications).



The ducts are supplied in harnesses 100 m or 300 m long.

To create a line, it is possible to connect the individual harnesses with couplings.

For larger line sections, a 1750 m package is also available (for the dimension 06050 - 1250 m), supplied on wooden drums.



KOPOS KOLÍN a.s. supplies fibre-optic cable ducts even in large harnesses of 2000 m (06040) and 1250 m (06050) for installation on unwinding metal drums.

When the drum side plate is removed, the coil is slid onto the drum, the side plate is replaced and the drum is ready for unwinding.

The advantage of this solution consists in cost savings thanks to the transport of a larger quantity of wooden drums.

The air-blown installation technology allows the installation of fibre-optic cables with an outer diameter of 6,5 to 32 mm in suitable protective pipes of polyethylene by means of a large air mass. Thanks to the generated laminar air flow in the duct and the additional mechanical cable drift inside the duct, the fibre-optic cable is carried and moved forward. With a good technological procedure, it is possible to air-blow very long fibre-optic cables in ducts, even exceeding 2000 m. A huge advantage of this method is a very careful installation of the cables - without any pulling force. KOPOS KOLÍN a.s. does not install the ducts; please contact a provider of such services who possesses the necessary technology for duct installation and air-blowing of cables.



HDPE communication cable ducts

750 N / 20 cm	HDPE halogen-free not self-snuffing	-5 - + 50 °C	A

conf.	description
A...	color: orange
B...	color: red
C...	color: blue
D...	color: green
E...	color: yellow
F...	color: black
K...	color: light grey
L...	color: dark grey
...B	drum
...P	cable harness, pallet
...S100	package: cable harness 100 m
...S300	package: cable harness 300 m

Shock resistance: N (normal, ČSN EN 50086-2-4/A1)  
 Bend resistance: flexible  
 The minimum bending radius for production and storage is 400 - 500 mm (see the table).  
 The protectors are tested under pressure of 1,5 MPa for the time of 1 hour.  
 The inner diameter of standard dimensions is indicated in bold.  
 The packages on wooden drums and pallets for unwinding drums are supplied only per order as specified by the customer.

	configuration												
	mm	mm	mm	m	kg								
<b>06025</b>	AS100	BS100	CS100	DS100	ES100	FS100	KS100	LS100	25	<b>20</b>	400	100	16
<b>06032</b>	AB	BB	CB	DB	EB	FB	KB	LB	32	<b>26 / 27</b>	400	1750	642
	AS100	BS100	CS100	DS100	ES100	FS100	KS100	LS100				100	26
<b>06040</b>	AB	BB	CB	DB	EB	FB	KB	LB	40	<b>33 / 34 / 35</b>	400	1750	844
	AP	BP	CP	DP	EP	FP	KP	LP				2000	778
	AS100	BS100	CS100	DS100	ES100	FS100	KS100	LS100				100	39
	AS300	BS300	CS300	DS300	ES300	FS300	KS300	LS300				300	116
<b>06050</b>	AB	BB	CB	DB	EB	FB	KB	LB	50	<b>41 / 44</b>	500	1250	758
	AP	BP	CP	DP	EP	FP	KP	LP				1250	594
	AS100	BS100	CS100	DS100	ES100	FS100	KS100	LS100				100	48



### HDPE coupling

-5 - + 50 °C	A

conf.	description
K...	color: grey
...B	package: small 1 pc

	conf.	pipes mm	pcs	kg
<b>05025</b>	KB	25	1	0,09
<b>05030</b>	KB	32	1	0,16
<b>05040</b>	KB	40	1	0,32
<b>05050</b>	KB	50	1	0,46

Protector coupling of optical cables is designed to join the pipes when tracing and guarantees its perfect connection.



### HDPE terminal

-5 - + 50 °C	A

conf.	description
K...	color: grey
...B	package: small 1 pc

	conf.	pipes mm	pcs	kg
<b>05024</b>	KB	25	1	0,05
<b>05031</b>	KB	32	1	0,08
<b>05041</b>	KB	40	1	0,15
<b>05051</b>	KB	50	1	0,25

The terminal of optical cableprotector is designed to terminate the tracing.



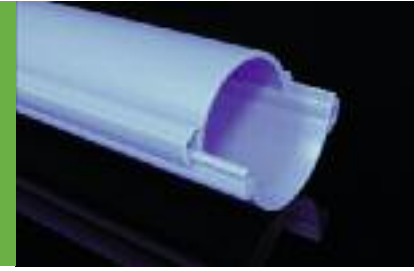
### HDPE terminal with valve

-5 - + 50 °C	A

conf.	description
K...	color: black
...B	package: small 1 pc

	conf.	pipes mm	pcs	kg
<b>05032</b>	KB	32	1	0,10
<b>05042</b>	KB	40	1	0,16

The terminal with a valve is designed for inspecting the installed duct using pressurized air.



**KOPOHALF®** - divided cable duct

				conf. description
450 N / 20 cm 750 N / 20 cm	HDPE <b>halogen-free</b> not self-snuffing	storage, permanent installation: -45 - +75 °C assembly: +5 - +75°C	A	B... color: red C... color: blue ...A package: in dismantled condition ...AD package: at completed size

	configuration						
		N / cm	mm	mm	m	cm	m kg
<b>06110/2</b>	BA CA	450 / 20	110	100	3	56 x 85 x 300	162 375
	BAD CAD					56 x 85 x 300	105 246
<b>06160/2</b>	BA CA	750 / 20	160	138	3	56 x 60 x 300	72 360
	BAD CAD					56 x 85 x 300	45 228

A system of divided cable ducts is suitable mainly for a protection of underground cable laying and for a laying-out of the energy and communication lines.

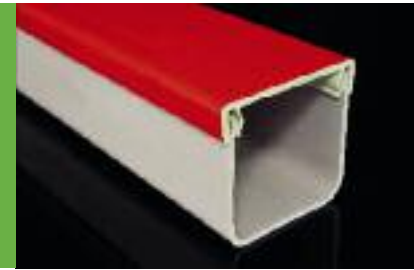
Another possible application is a protection of already installed underground cables.

The cable ducts are delivered in dismantled condition.

When installing, the cables are put in the bottom part and then the top part is snapped to the bottom one.

The divided cable ducts are manufactured and tested in accordance with standard ČSN 50 086-2-4.

Connecting of protectors is performed by overlapping joined lower parts with an upper part at length of approximately 30 cm.



**KOPOKAN** - earthen channel

PVC - recycled, self-snuffing	-25 - +70°C	A - C2

	mm	mm	m	kPa	m	kg
<b>KOPOKAN 1</b>	100	100	2	483	324	1312
<b>KOPOKAN 2</b>	120	100	2	223	252	847
<b>KOPOKAN 3</b>	130	140	2	285	224	1180
<b>KOPOKAN 4</b>	200	125	2	204	140	883

Earthen channels are intended for mechanical protection of installation of engineering networks to be loaded under ground.

By its technical parameters those fully replace the earlier used concrete channels.

There is possible to use them for additional protection already installed earthen engineering networks.

Earthen channels are delivered including the red lid.

The connection is via conjunctions.

Compression strength limit tested for a length of 300 mm.



**connection for KOPOKAN**

	mm	mm	mm	pcs	kg
<b>SPOJKA K1</b>	120	80	100	10	1,1
<b>SPOJKA K2</b>	138	80	100	10	1,2
<b>SPOJKA K3</b>	151	80	100	10	1,3
<b>SPOJKA K4</b>	221	80	120	10	1,6

**Storage cable ducts**

UV-stable corrugated protection ducts KOPOFLEX® can be stored on open, hardened surfaces.

Other cable ducts (KOPOFLEX®, KOPODUR®, fibre-optic cable ducts HDPE, KOPOHALF® and KOPOKAN) can be stored on open, hardened surfaces, but have to be protected against the long-term effects of sunlight.

All duct accessories are to be stored in covered halls.

**Manufacturer:** EGÚ Brno, a. s.  
Electrical Network Department

**Client:** KOPOS KOLÍN a.s.,  
Havlíčková 432, 280 94 Kolín IV

**Manufacturer's contract number:** 12 002  
**Client's contract number:** order 120111

# DOCUMENTS FOR DESIGNING PLASTIC CABLE DUCTS

**Prepared by:** Ing. Petr Lehký  
Helena Kváčová

**Head of Department:** Ing. Petr Lehký

**Director:** Ing. Zdeněk Špaček, CDc.

## INTRODUCTION

Maximum load value determined in the document for the projection of plastic cable ducts is based on “Dimensioning Cable Ducts” methodology that has been prepared for the sphere of power engineering.

Following tables specify the total load values for individual types of surface loading, including the influence of dynamic effects and the load resulting from the soil weight.

The cases of exceeding the permissible load (for the assortment of cable ducts offered) are printed in bold and shaded.

The load capacity of cable ducts has been determined with regard to max. 5% deformation. Cable ducts passing through a track bed may not be deformed by more than 3%. It implies that the load may not exceed the value of permissible stress at the deformation of 3 %.

The permissible load on cable ducts has been determined based on their ring stiffness set in accordance with ČSN EN ISO 9969.

**Flexible corrugated double-wall cable duct KOPOFLEX®**  
**KF 09040**

Ring stiffness in accordance with ČSN EN ISO 9969: S = 20,9 kPa

Permissible load at the deformation of 3%: Q = 187 kPa

Permissible load at the deformation of 5%: Q = 311,7 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

Flexible corrugated double-wall cable duct KOPOFLEX®  
**KF 09050**

Ring stiffness in accordance with ČSN EN ISO 9969: S = 20 kPa

Permissible load at the deformation of 3%: Q = 181,8 kPa

Permissible load at the deformation of 5%: Q = 303,1 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Flexible corrugated double-wall cable duct KOPOFLEX®

# KF 09063

Ring stiffness in accordance with ČSN EN ISO 9969: S = 14,45 kPa

Permissible load at the deformation of 3%: Q = 149,7 kPa

Permissible load at the deformation of 5%: Q = 217,4 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	<b>223,6</b>	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	<b>221,2</b>	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	<b>157,2</b>

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

**Flexible corrugated double-wall cable duct KOPOFLEX®**  
**KF 09075**

Ring stiffness in accordance with ČSN EN ISO 9969: S = 11,98 kPa

Permissible load at the deformation of 3%: Q = 135,4 kPa

Permissible load at the deformation of 5%: Q = 219,5 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	<b>223,6</b>	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	<b>221,2</b>	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,0</b>	105,4	85,7	90,2	98,3	107,9	118,4	129,6	<b>141,4</b>	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,4</b>	106,2	87,4	93,0	101,9	111,8	122,4	133,5	<b>145,1</b>	<b>157,2</b>

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Flexible corrugated double-wall cable duct KOPOFLEX® KF 09090

Ring stiffness in accordance with ČSN EN ISO 9969: S = 8,8 kPa  
 Permissible load at the deformation of 3%: Q = 112,9 kPa  
 Permissible load at the deformation of 5%: Q = 179,9 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	857,6	489,6	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	604,7	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

**Flexible corrugated double-wall cable duct KOPOFLEX®**  
**KF 09110**

Ring stiffness in accordance with ČSN EN ISO 9969: S = 9,37 kPa

Permissible load at the deformation of 3%: Q = 120,3 kPa

Permissible load at the deformation of 5%: Q = 195,1 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	<b>223,6</b>	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	<b>221,2</b>	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	<b>211,1</b>	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,0</b>	105,4	85,7	90,2	98,3	107,9	118,4	<b>129,6</b>	<b>141,4</b>	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,4</b>	106,2	87,4	93,0	101,9	111,8	<b>122,4</b>	<b>133,5</b>	<b>145,1</b>	<b>157,2</b>

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Flexible corrugated double-wall cable duct KOPOFLEX® KF 09120

Ring stiffness in accordance with ČSN EN ISO 9969: S = 8,6 kPa

Permissible load at the deformation of 3%: Q = 115,3 kPa

Permissible load at the deformation of 5%: Q = 189,8 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	<b>223,6</b>	<b>170,6</b>	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	<b>221,2</b>	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	<b>170,4</b>	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	<b>211,1</b>	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,0</b>	105,4	85,7	90,2	98,3	107,9	<b>118,4</b>	<b>129,6</b>	<b>141,4</b>	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,4</b>	106,2	87,4	93,0	101,9	111,8	<b>122,4</b>	<b>133,5</b>	<b>145,1</b>	<b>157,2</b>

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

**Flexible corrugated double-wall cable duct KOPOFLEX®**  
**KF 09125**

Ring stiffness in accordance with ČSN EN ISO 9969: S = 8,4 kPa

Permissible load at the deformation of 3%: Q = 112,4 kPa

Permissible load at the deformation of 5%: Q = 180,2 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	<b>223,6</b>	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	<b>221,2</b>	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	<b>211,1</b>	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,0</b>	105,4	85,7	90,2	98,3	107,9	<b>118,4</b>	<b>129,6</b>	<b>141,4</b>	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,4</b>	106,2	87,4	93,0	101,9	111,8	<b>122,4</b>	<b>133,5</b>	<b>145,1</b>	<b>157,2</b>

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Flexible corrugated double-wall cable duct KOPOFLEX® KF 09160

Ring stiffness in accordance with ČSN EN ISO 9969: S = 6,0 kPa

Permissible load at the deformation of 3%: Q = 100,8 kPa

Permissible load at the deformation of 5%: Q = 160,5 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	857,6	489,6	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	604,7	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

**Flexible corrugated double-wall cable duct KOPOFLEX®**  
**KF 09175**

Ring stiffness in accordance with ČSN EN ISO 9969: S = 6,2 kPa

Permissible load at the deformation of 3%: Q = 102,3 kPa

Permissible load at the deformation of 5%: Q = 171,4 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	<b>223,6</b>	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	<b>221,2</b>	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	<b>211,1</b>	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,0</b>	<b>105,4</b>	85,7	90,2	98,3	<b>107,9</b>	<b>118,4</b>	<b>129,6</b>	<b>141,4</b>	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,4</b>	<b>106,2</b>	87,4	93,0	101,9	<b>111,8</b>	<b>122,4</b>	<b>133,5</b>	<b>145,1</b>	<b>157,2</b>

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Rigid corrugated double-wall cable ducts KOPODUR®

# KD 09050

Ring stiffness in accordance with ČSN EN ISO 9969: S = 27,2 kPa

Permissible load at the deformation of 3%: Q = 223,5 kPa

Permissible load at the deformation of 5%: Q = 372,4 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Rigid corrugated double-wall cable ducts KOPODUR® KD 09063

Ring stiffness in accordance with ČSN EN ISO 9969: S = 19,33 kPa  
 Permissible load at the deformation of 3%: Q = 177,9 kPa  
 Permissible load at the deformation of 5%: Q = 270,24 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Rigid corrugated double-wall cable ducts KOPODUR® KD 09075

Ring stiffness in accordance with ČSN EN ISO 9969: S = 11,84 kPa

Permissible load at the deformation of 3%: Q = 134,6 kPa

Permissible load at the deformation of 5%: Q = 216,5 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	857,6	489,6	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	604,7	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Rigid corrugated double-wall cable ducts KOPODUR® KD 09090

Ring stiffness in accordance with ČSN EN ISO 9969: S = 8,9 kPa

Permissible load at the deformation of 3%: Q = 117,6 kPa

Permissible load at the deformation of 5%: Q = 185,1 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	<b>223,6</b>	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	<b>221,2</b>	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	<b>211,1</b>	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,0</b>	105,4	85,7	90,2	98,3	107,9	<b>118,4</b>	<b>129,6</b>	<b>141,4</b>	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,4</b>	106,2	87,4	93,0	101,9	111,8	<b>122,4</b>	<b>133,5</b>	<b>145,1</b>	<b>157,2</b>

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Rigid corrugated double-wall cable ducts KOPODUR® KD 09110

Ring stiffness in accordance with ČSN EN ISO 9969: S = 9,97 kPa

Permissible load at the deformation of 3%: Q = 123,8 kPa

Permissible load at the deformation of 5%: Q = 192,9 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	857,6	489,6	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	604,7	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Rigid corrugated double-wall cable ducts KOPODUR®

# KD 09120

Ring stiffness in accordance with ČSN EN ISO 9969: S = 9,6 kPa

Permissible load at the deformation of 3%: Q = 126,2 kPa

Permissible load at the deformation of 5%: Q = 211,3 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	<b>223,6</b>	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	<b>221,2</b>	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,0</b>	105,4	85,7	90,2	98,3	107,9	118,4	<b>129,6</b>	<b>141,4</b>	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,4</b>	106,2	87,4	93,0	101,9	111,8	122,4	<b>133,5</b>	<b>145,1</b>	<b>157,2</b>

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Rigid corrugated double-wall cable ducts KOPODUR®

# KD 09125

Ring stiffness in accordance with ČSN EN ISO 9969: S = 9,4 kPa

Permissible load at the deformation of 3%: Q = 120,8 kPa

Permissible load at the deformation of 5%: Q = 195,1 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	857,6	489,6	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	604,7	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Rigid corrugated double-wall cable ducts KOPODUR® KD 09160

Ring stiffness in accordance with ČSN EN ISO 9969: S = 7,2 kPa

Permissible load at the deformation of 3%: Q = 107,8 kPa

Permissible load at the deformation of 5%: Q = 179,6 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	<b>223,6</b>	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	<b>221,2</b>	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	<b>211,1</b>	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,0</b>	105,4	85,7	90,2	98,3	<b>107,9</b>	<b>118,4</b>	<b>129,6</b>	<b>141,4</b>	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,4</b>	106,2	87,4	93,0	101,9	<b>111,8</b>	<b>122,4</b>	<b>133,5</b>	<b>145,1</b>	<b>157,2</b>

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Rigid corrugated double-wall cable ducts KOPODUR®

# KD 09175

Ring stiffness in accordance with ČSN EN ISO 9969: S = 6,2 kPa

Permissible load at the deformation of 3%: Q = 102,4 kPa

Permissible load at the deformation of 5%: Q = 171,3 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	857,6	489,6	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	604,7	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Rigid corrugated double-wall cable ducts KOPODUR® KD 09200

Ring stiffness in accordance with ČSN EN ISO 9969: S = 5,63 kPa

Permissible load at the deformation of 3%: Q = 97,1 kPa

Permissible load at the deformation of 5%: Q = 156,0 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	<b>223,6</b>	<b>170,6</b>	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	<b>221,2</b>	<b>159,1</b>	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	<b>170,4</b>	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	<b>211,1</b>	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,0</b>	<b>105,4</b>	85,7	90,2	<b>98,3</b>	<b>107,9</b>	<b>118,4</b>	<b>129,6</b>	<b>141,4</b>	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,4</b>	<b>106,2</b>	87,4	93,0	<b>101,9</b>	<b>111,8</b>	<b>122,4</b>	<b>133,5</b>	<b>145,1</b>	<b>157,2</b>

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## HDPE communication cable duct

## 06032

Ring stiffness in accordance with ČSN EN ISO 9969: S = 66,66 kPa

Permissible load at the deformation of 3%: Q = 451,7 kPa

Permissible load at the deformation of 5%: Q = 678,1 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	857,6	489,6	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	604,7	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## HDPE communication cable duct 06040

Ring stiffness in accordance with ČSN EN ISO 9969: S = 62,62 kPa

Permissible load at the deformation of 3%: Q = 428,3 kPa

Permissible load at the deformation of 5%: Q = 656,5 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	489,6	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	604,7	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Divided cable duct KOPOHALF®

## 06110/2

Ring stiffness in accordance with ČSN EN ISO 9969: S = 9,8 kPa

Permissible load at the deformation of 3%: Q = 122,8 kPa

Permissible load at the deformation of 5%: Q = 204,7 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	857,6	489,6	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	604,7	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

Divided cable duct KOPOHALF®  
**06160/2**

Ring stiffness in accordance with ČSN EN ISO 9969: S = 15,0 kPa

Permissible load at the deformation of 3%: Q = 152,0 kPa

Permissible load at the deformation of 5%: Q = 254,8 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	<b>157,2</b>

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Highlighting the cases, when ducts fail to meet the requirements or their use is on the limit of permissible load.

## Earthen channel KOPOKAN

**KOPOKAN 1**

Ring stiffness in accordance with ČSN EN ISO 9969: S = 80,53 kPa

Permissible load at the deformation of 3%: Q = 531,9 kPa

Permissible load at the deformation of 5%: Q = 802,9 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	489,6	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	604,7	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when channels fail to meet the requirements or their use is on the limit of permissible load.

## Earthen channel KOPOKAN

# KOPOKAN 2

Ring stiffness in accordance with ČSN EN ISO 9969: S = 165 kPa

Permissible load at the deformation of 3%: Q = 87,2 kPa

Permissible load at the deformation of 5%: Q = 131 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	<b>223,6</b>	<b>170,6</b>	<b>138,1</b>	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	<b>221,2</b>	<b>159,1</b>	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	<b>170,4</b>	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	<b>211,1</b>	<b>141,8</b>	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,0</b>	<b>105,4</b>	<b>85,7</b>	<b>90,2</b>	<b>98,3</b>	<b>107,9</b>	<b>118,4</b>	<b>129,6</b>	<b>141,4</b>	<b>153,7</b>
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	<b>137,4</b>	<b>106,2</b>	<b>87,4</b>	<b>93,0</b>	<b>101,9</b>	<b>111,8</b>	<b>122,4</b>	<b>133,5</b>	<b>145,1</b>	<b>157,2</b>

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Highlighting the cases, when channels fail to meet the requirements or their use is on the limit of permissible load.

## Earthen channel KOPOKAN

# KOPOKAN 3

Ring stiffness in accordance with ČSN EN ISO 9969: S = 199 kPa

Permissible load at the deformation of 3%: Q = 144 kPa

Permissible load at the deformation of 5%: Q = 186 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	857,6	489,6	315,3	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	604,7	340,2	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	297,4	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	365,6	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when channels fail to meet the requirements or their use is on the limit of permissible load.

## Earthen channel KOPOKAN

# KOPOKAN 4

Ring stiffness in accordance with ČSN EN ISO 9969: S = 284 kPa

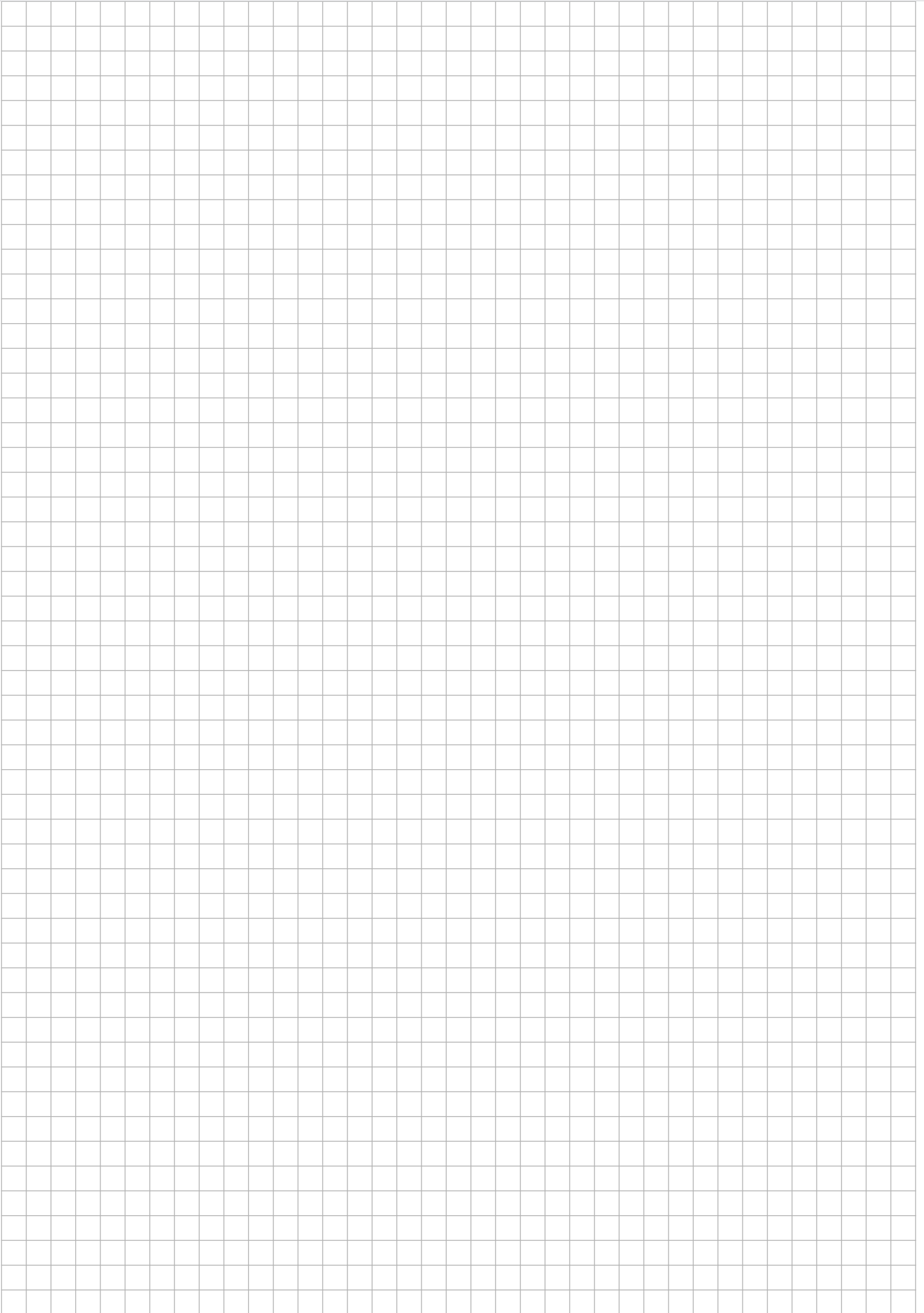
Permissible load at the deformation of 3%: Q = 223 kPa

Permissible load at the deformation of 5%: Q = 283 kPa

type of load	load by soil weight									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	8,55	11,40	14,25	17,10	19,95	22,80	25,65	28,50	31,35	
type of load	road load class A									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>857,6</b>	<b>489,6</b>	<b>315,3</b>	223,6	170,6	138,1	117,1	103,3	93,9	
type of load	road load class B									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>604,7</b>	<b>340,2</b>	221,2	159,1	123,5	102,0	88,6	79,9	74,4	
type of load	drive load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>297,4</b>	170,4	113,8	84,9	68,8	59,6	54,3	51,4	50,1	
type of load	pavement and cycling track load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	63,4	42,0	33,7	30,5	29,8	30,3	31,6	33,3	35,4	
type of load	tram load									
height of protection (m)	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10	
total load (kPa)	<b>365,6</b>	211,1	141,8	106,1	86,3	74,9	68,4	64,8	63,1	
type of load	single rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,0	105,4	85,7	90,2	98,3	107,9	118,4	129,6	141,4	153,7
type of load	double rail load UIC 71 train									
height of protection (m)	0,8	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0
total load (kPa)	137,4	106,2	87,4	93,0	101,9	111,8	122,4	133,5	145,1	157,2

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Highlighting the cases, when channels fail to meet the requirements or their use is on the limit of permissible load.



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**KOPOKAN**

KOPOKAN - Earthing Channel

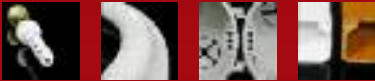
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