BV TWENTSCHE KABELFABRIEK

TWENKAPLUS

LOW-VOLTAGE INSTALLATION CABLES AND WIRE

CONTENTS

Photo's with courtesy of:
Aeroview Rotterdam
Beckmann Elektrotechniek BV
Croon Elektrotechniek BV
ING Vastgoed BV
Nettenbouw BV

The Twentsche Kabelfabriek (TKF) has developed a wide range of products through the years. Low-voltage installation cables have been part of these since considerable time. Because of continuous research in our Research & Development department and by keeping a close track of the market and technical developments, TKF is able to react alertly to new developments.
For example the introduction of the XMvK as the successor of the VMvK and the flame-retardant halogen-free versions to prevent as much personal harm and material damage as possible in case of a fire.

Twenkaplus cables and wires can be divided into four categories.
- Twenkaplus 0.6/1 kV, which covers the YMvK versions, both armoured and unarmoured, with mb or mbzh outer sheathing as well as the lead covered versions.
- Twenkaplus 450/750 V, which covers the XMvK, the replacement of the thinner types of the VMvK for 100% and therefore suitable for light, single connections.
- VD Installation Wire 450/750 V.
- Twenkaplus Special 0.6/1 V, which covers the flexible Transformer connecting cables and the EMC motor cables.

While developing the Twenkaplus cables, TKF has let itself be guided by international and national standards and specifications wherever possible. That is why the cables meet the following standards and specifications:
- electrical properties: IEC 228
- testing of XLPE conductor insulation, PVC and HFFR sheathing: IEC 502, KEMA K42 and HD 604
- flame retardancy testing: IEC 332-1, IEC 332-3, KEMA K42 and HD 604
- construction and composition: KEMA K42, IEC 502 and HD 604.

The Twenkaplus versions 0.6/1 kV and 450/750 are standardly supplied with KEMA TYPE KEUR and the quality mark KCQ (KEMA Certified Quality). Apart from the final product (KEMA KEUR) and the organisation (ISO 9001), KCQ also certifies the processes and the inspections involved. This warrants the reproducibility of the excellent quality of the final product.
Each version meets the Low Voltage Directive (LVD). The packaging of the Twenkaplus cables is supplied with a CE imprint.

Apart from the cables mentioned in this brochure we can also supply special versions, like cables with extra flexibility; function maintenance (up to 180 minutes, according to IEC 331); cables with chemical resistant sheathing (a combination of an aluminium shield, HDPE and polyamide). Please contact our sales department for further information.

Many versions are supplied from stock, so a short time of delivery can be guaranteed.

Advantages of Twenkaplus low-voltage installation cables:

- **High, continuous conductor capacity**
- **Well resistant to brief overloading**
- **Low-temperature resistant**
- **Easy to strip**
- **Easy to pull through pipes**
- **Because of this a shorter installing time**
- **Good chemical resistance**
- **Excellent flexibility**
- **Highly wear-resistant**
- **A multiplicity of possibilities**
- **Several versions in stock**
- **KEMA-KEUR and KCQ**

MATERIALS

The materials that are being used in Twenkaplus cables warrant excellent properties, both electrical as well as mechanical. The various applications circumstances that, for example, occur in industrial and petrochemical installations, factories, substations, building of public utilities and house-building, have been taken into account as well.

XLPE CONDUCTOR INSULATION

Twenkaplus cables are insulated with XLPE (cross-linked polyethylene), (except the transformer-cable) and are therefore suitable for a maximum continuous conductor temperature of 90 °C. Even a brief conductor temperature of 250 °C , as may occur during a temporary overloading, causes no damage in the conductor insulation. In addition to the good qualities during high temperatures, XLPE is also low-temperature resistant, owing to the relatively low temperature at which the material becomes brittle (-70 °C). XLPE has a very low dielectrical loss factor (tgΔ=0.003). Furthermore, XLPE does not contain hygroscopic components. As a result it has a low humidity absorption and also a good chemical resistance.
As far as the mechanical properties are concerned, XLPE complies meets the specifications IEC 502, HD 604 and K 42.

PVC SHEATHING

The PVC-compound that is used is flame-retardant (LOI>30%), except for the XMvK cables and the VD wire. The PVC outer sheathing meets the fire test according to IEC 332-1. The PVC-compound has excellent mechanical properties, which is being reflected in the installation qualities such as flexibility, stripability and a great durability. This makes the cables easy to strip and to pull through pipes, which decreases the installation time considerably. The material is also well resistant to chemicals and meets the specifications IEC 502, and for the mechanical properties HD 604-4C and K42.
The oil-resistance meets the specification IEC 811-2-1 (ASTM oil 2 during 24 hours at 70 °C).

HFFR SHEATHING

The HFFR-compound, that is used for the flame-retardant halogen-free cables, is also flame-retardant (LOI>30%) and contains no halogen or heavy metals. The sheathing meets the fire-resistance tests according IEC 332-1. The entire cable meets the fire-resistance tests according IEC 332-3. Through extensive research, TKF succeeded in giving this material the same installation qualities as PVC as well as a low humidity absorption and a high chemical resistance. The material meets the specifications HD 604-5C and K42. The oil-resistance meets IEC 811-2-1 (ASTM oil 2 during 24 hours at 70 °C.

THERMOPLASTIC RUBBER

The thermoplastic rubber compound is used for insulation of the transformer connecting cables.
This highly flexible material allows a small bending radius. This conductor insulation is also suitable for a maximum continuous conductor temperature of 90 °C.

FIRE-RESISTANT INSULATION

A fire-resistant insulation affords the cables to maintain their functioning during a fire. This means that the fire-resistance is tested by measuring the function maintenance under current load and voltage load, in a fire at a temperature of 700 °C, for 3 hours according IEC 331.

LEAD COVERING

As an extra protection, for example for the installation in polluted surroundings, the Twenkaplus cables can be equipped with a lead covering.

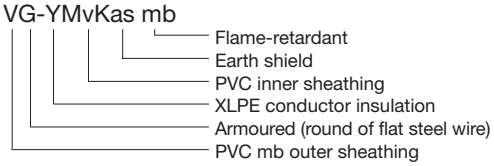
CODING

Conductors: rs = round stranded
sv = sector-shaped

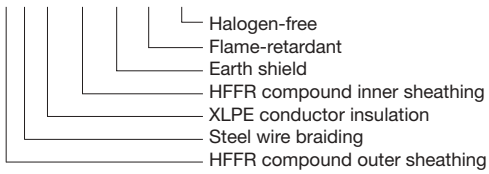
Conductor insulation:	Y or X	=	cross-linked polyethylene (XLPE)
	T	=	thermoplastic rubber
Sheathing:	L	=	lead
	V	=	polyvinyl chloride (PVC)
	Z	=	HFFR compound
	mb	=	flame-retardant
	zh	=	halogen-free
	fb	=	function maintenance (180 minutes)
Armouring:	G	=	armoured (round or flat steel wire)
	O	=	steel wire braiding
	as	=	earth shield

Examples

VG-YMvKas mb



ZO-YMzKas mbzh



BENDING RADIUS (in mm)

	During repositioning	During installation (once-only)
PVC-sheathing*	7 x D	4 x D
HFFR sheathing	10 x D	8 x D
Lead covering	15 x D	75% of 15 x D
VD installation wire	10 x D	10 x D
Transformer connecting cable	5 x D	4 x D
EMC motor cable	10 x D	8 x D

D = the outer diameter of the cables (in mm)
(According K42: 10 x D en 8 x D resp.)*

MAXIMUM TENSILE FORCE (in N)

	Using a pulling head	Using a pulling shoe
unarmoured	50 x S	3 x D^2 (max. 1 kN)
with braiding	50 x S	3 x D^2 (max. 1 kN)
with lead covering	50 x S	3 x D^2 (max. 1 kN)
with wire armouring	50 x S	8 x D^2 (max. 1 kN)

D = the outer diameter of the cables (in mm)
S = the total surface of the conductors (in mm^2)

COLOURS OF THE CONDUCTORS

Colours of the conductor YMvKmb:

2 conductors: black and blue
3 conductors: yellow-green, black and blue
4 conductors: yellow-green, black, blue and brown
5 conductors: yellow-green, black, blue, brown and black
Variations available on request

Colours of the conductor YMvKas mb:

1 conductor : black
2 conductors: black and blue
3 conductors: black, blue and brown
4 conductors: black, blue, brown and black
5 conductors: black, blue, brown, black and black
Variations available on request

Colours of the conductor VD Installation wire

The installation wire can be supplied from stock in many different colours:
4mm^2 - 35mm^2 : black, blue, brown and yellow/green
>50mm^2 : black and yellow/green
Other colours available on request

Colours of the conductor of EMC motor cable:

3 conductors: black, blue and brown

INSTALLATION TEMPERATURE

The minimum installation temperature according HD 604 is 0 °C under normal conditions. This temperature applies to the cable to be installed, not to the temperature of the environment.
We advise to raise the temperature of the cable to plm 5 °C if possible.

OPERATIONAL CAPACITY/TEST VOLTAGE

The stated mutual capacities are based on measurements as stated in KEMA specification K42. It is possible that the mutual capacity varies in real terms (up to approx. 30%). It is therefore advisable that the standards and/or the practice directions concerned are consulted.

(in nF/km) for YMvK mb, YMzK mbzh, YMvKas mb and YMzKas mbzh TWENKAPLUS low-voltage cables.

	YMvK mb & YMzK mbzh				YMvKas mb & YMzKas mbzh				
C.S.A.	2 cond.	3 cond.	3 cond.	4 cond.	2 cond.	2 cond.	3 cond.	3 cond.	4 cond.
mm²	alternat.	3-phase	alternat.	3-phase	alternat.	alternat.	3-phase	alternat.	3-phase
	current	current	current	current	3-phase	current	current	current	current
					current sym.	asym.	sym.	sym.	
1.5	54	120	58	130	105	153	195	76	200
2.5	64	125	62	135	120	170	210	104	210
4	67	135	67	145	130	190	230	115	228
6	72	145	70	155	135	205	250	120	248
10	80	165	81	174	150	245	295	145	284
16	90	180	91	189	180	275	325	163	315
25	95	195	95	203	200	295	355	175	340
35	97	205	100	213	220	310	370	183	355
50	108	180	90	187	230	330	345	184	335
70	115	215	110	223	235	350	400	215	385
95		245	122	252			450	135	425
120		255	130	262			470	250	445
150		280	133	285			515	260	480
185		285	135	290			535	270	495
240		290	140	295			555		510

(in nF/km) for XMvK, TWENKAPLUS low-voltage cables*

C.S.A. mm²	2 conductors	3 conductors	4 conductors	5 conductors
1.5	63	125	140	145
2.5	72	142	167	175

(*) Operational capacity for symmetrical alternating current and three-phase current systems.

	YMvK mb	XMvK	VD Wire	Transformer	EMC
				cable	motor cable
Testvoltage in V	3500	2500	2500	3500	3500

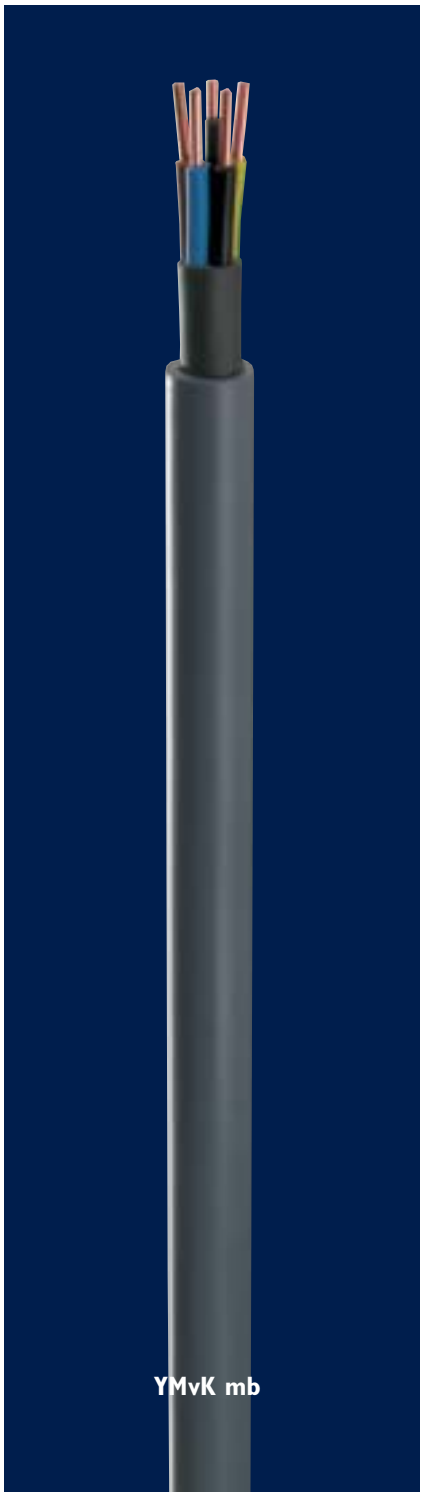
CONDUCTOR RESISTANCE/SELF-INDUCTION

The conductor resistance is the maximum resistance permitted according KEMA specification K42. The induction is based on measurements in accordance with this specification. It is possible that the induction varies in real terms. It is therefore advisable that the standards and/or the practical directions concerned are consulted.

C.S.A. mm²	Max. conductive restance (in Ω/km)	Induction YmvK mb, YMzK mbzh & XMvK (in mH/km)	Induction YMvKas mbzh & YMzKas mbzh (in mH/km)
1.5	12.1	0.33	0.37
2.5	7.41	0.31	0.35
4	4.61	0.30	0.32
6	3.08	0.28	0.30
10	1.83	0.26	0.28
16	1.15	0.25	0.27
25	0.727	0.24	0.26
35	0.524	0.23	0.25
50	0.387	0.20	0.23
70	0.268	0.19	0.20
95	0.193	0.18	0.19
120	0.153	0.17	0.19
150	0.124	0.17	0.18
185	0.0991	0.17	0.17
240	0.0754	0.16	0.17

YMvK mb/YMzK mbzh

The Twenkaplus cables YMvK mb and the YMzK mbzh can be applied in low-voltage installations where the fire safety has to meet stringent requirements.



Construction: YMvK mb

conductors:
pure electrolytic copper
insulation:
Twenkaplus XLPE
filling:
PVC compound
(in sector-shaped conductors and multicore cables (n > 5) the core is taped with a synthetic tape)
outer sheathing:
PVC flame-retardant
colour of the sheathing:
grey

Construction: YMzK mbzh

conductors:
pure electrolytic copper
insulation:
Twenkaplus XLPE
filling:
HFFR compound (in sector-shaped conductors and multicore cables (n > 5) the core is taped with a synthetic tape)
outer sheathing:
HFFR compound
colour of the sheathing:
grey

Available in a fire-resistant construction (180 minutes) on request.

YMvK mb & YMzK mbzh		
Type	Nom. Cable Weight kg/km	Nom. Diameter mm
2x1.5	133	9.7
3x1.5	149	10.1
4x1.5	172	10.8
5x1.5	202	11.6
6x1.5	195	11.9
7x1.5	205	11.9
8x1.5	234	12.8
10x1.5	330	15.6
12x1.5	317	15.1
14x1.5	359	16.0
16x1.5	401	16.5
19x1.5	455	17.3
24x1.5	590	19.8
30x1.5	678	21.4
37x1.5	820	23.0
2x2.5	166	10.5
3x2.5	191	11.0
4x2.5	215	11.5
5x2.5	266	12.7
6x2.5	260	13.0
7x2.5	277	13.0
8x2.5	315	13.9
10x2.5	450	17.4
12x2.5	434	16.6
14x2.5	500	17.4
16x2.5	560	18.3
19x2.5	640	19.2
24x2.5	840	22.5
30x2.5	970	23.6
37x2.5	1170	25.4
1x4	72	6.4
2x4	220	11.6
3x4	255	12.1
4x4	303	13.0
5x4	365	14.1
1x6	92	6.9
2x6	280	12.7
3x6	332	13.3
4x6	405	14.3
5x6	480	15.5
1x10	140	8.3
2x10	440	15.8
3x10	530	16.6
4x10	625	17.7
5x10	770	19.7

YMvK mb & YMzK mbzh		
Type	Nom. Cable Weight kg/km	Nom. Diameter mm
1x16	200	9.3
2x16	615	17.9
3x16	740	18.7
4x16	880	19.9
5x16	1110	22.4
1x25	300	11.1
2x25	940	21.9
3x25	1160	23.2
4x25	1420	25.3
5x25	1720	27.7
1x35	405	12.3
2x35	1250	24.5
3x35	1530	25.4
4x35	1950	28.4
5x35	2360	31.3
1x50	420	13.7
3x50	1600	23.9
4x50	2110	27.7
5x50	3080	35.6
1x70	730	15.6
3x70	2250	27.7
4x70	2965	31.4
5x70	4390	41.3
1x95	1000	17.8
3x95	3060	31.9
4x95	4010	35.1
5x95	5890	46.7
1x120	1245	19.6
3x120	3790	35.1
4x120	5040	39.5
5x120	7710	54.1
1x150	1530	21.8
3x150	4720	37.5
4x150	6250	44.8
5x150	9070	58.9
1x185	1900	24.0
3x185	5850	41.8
4x185	7770	49.2
1x240	2580	27.7
3x240	7620	48.7
4x240	10200	56.1
1x300	3160	30.4

VO-YMvKas mb/ZO-YMzKas mbzh


VO-YMvKas


ZO-YMzKas mbzh

Construction: VO-YMvKas mb

conductors:
pure electrolytic copper
insulation:
Twenkaplus XLPE
filling:
PVC compound
(in sector-shaped conductors and multicore cables (n>5) the core is taped with a synthetic tape)
inner sheathing:
PVC
earth litze:
tinned copper
armouring:
braiding with round galvanised steel wire
outer sheathing:
PVC flame-retardant
colour of sheathing:
grey

Construction: ZO-YMzKas mbzh

conductors:
pure electrolytic copper
insulation:
Twenkaplus XLPE
filling:
HFFR compound (in sector-shaped conductors and multicore cables (n>5) the core is taped with synthetic tape)
inner sheathing:
HFFR compound
earth litze:
tinned copper
armouring:
braiding with round galvanised steel wire
outer sheathing:
HFFR compound
colour of sheathing:
grey

Available in a fire-resistant construction (180 minutes) on request.

VO-YMvKas mb & ZO-YMzKas mbzh		
Type	Nom. Cable Weight kg/km	Nom. Diameter mm
2x1.5	270	13.1
3x1.5	295	13.5
4x1.5	320	14.2
5x1.5	360	15.0
6x1.5	360	15.3
7x1.5	365	15.3
8x1.5	400	16.2
10x1.5	535	19.0
12x1.5	520	18.5
14x1.5	570	19.4
16x1.5	615	19.9
19x1.5	675	20.7
21x1.5	735	21.6
24x1.5	820	23.5
30x1.5	940	24.8
37x1.5	1100	26.2
2x2.5	315	13.9
3x2.5	340	14.4
4x2.5	385	14.9
5x2.5	430	16.1
6x2.5	435	16.4
7x2.5	450	16.4
8x2.5	495	17.3
10x2.5	665	20.8
12x2.5	650	20.0
14x2.5	712	20.8
16x2.5	790	21.4
19x2.5	890	22.6
24x2.5	1080	25.7
30x2.5	1265	27.0
37x2.5	1480	28.8
2x4	395	15.1
3x4	435	15.5
4x4	495	16.5
5x4	570	17.6
7x4	590	17.9
2x6	480	16.2
3x6	545	16.8
4x6	625	17.8
5x6	720	19.0
2x10	625	18.6
3x10	720	19.4
4x10	820	20.5

VG-YMvKas mb / ZG-YMzKas mbzh


VG-YMvKas mb


ZG-YMzKas mbzh

Construction: VG-YMvKas mb

conductors:
pure electrolytic copper

insulation:
Twenkaplus XLPE

filling:
PVC compound (in sector-shaped conductors and multicore cables (n>5) the core is taped with a synthetic tape)

inner sheathing:
PVC

armouring:
round or flat (dependent on the diameter of the cable) galvanised steel wire combined with copper wire and an open counter-spiral of galvanised steel band

outer sheathing:
PVC flame-retardant

colour of the sheathing:
grey

Constructie: ZG-YMzKas mbzh

conductors:
pure electrolytic copper

insulation:
Twenkaplus XLPE

filling:
HFFR compound (in sector shaped conductors and multicore cables (n>5) the core is taped with synthetic tape)

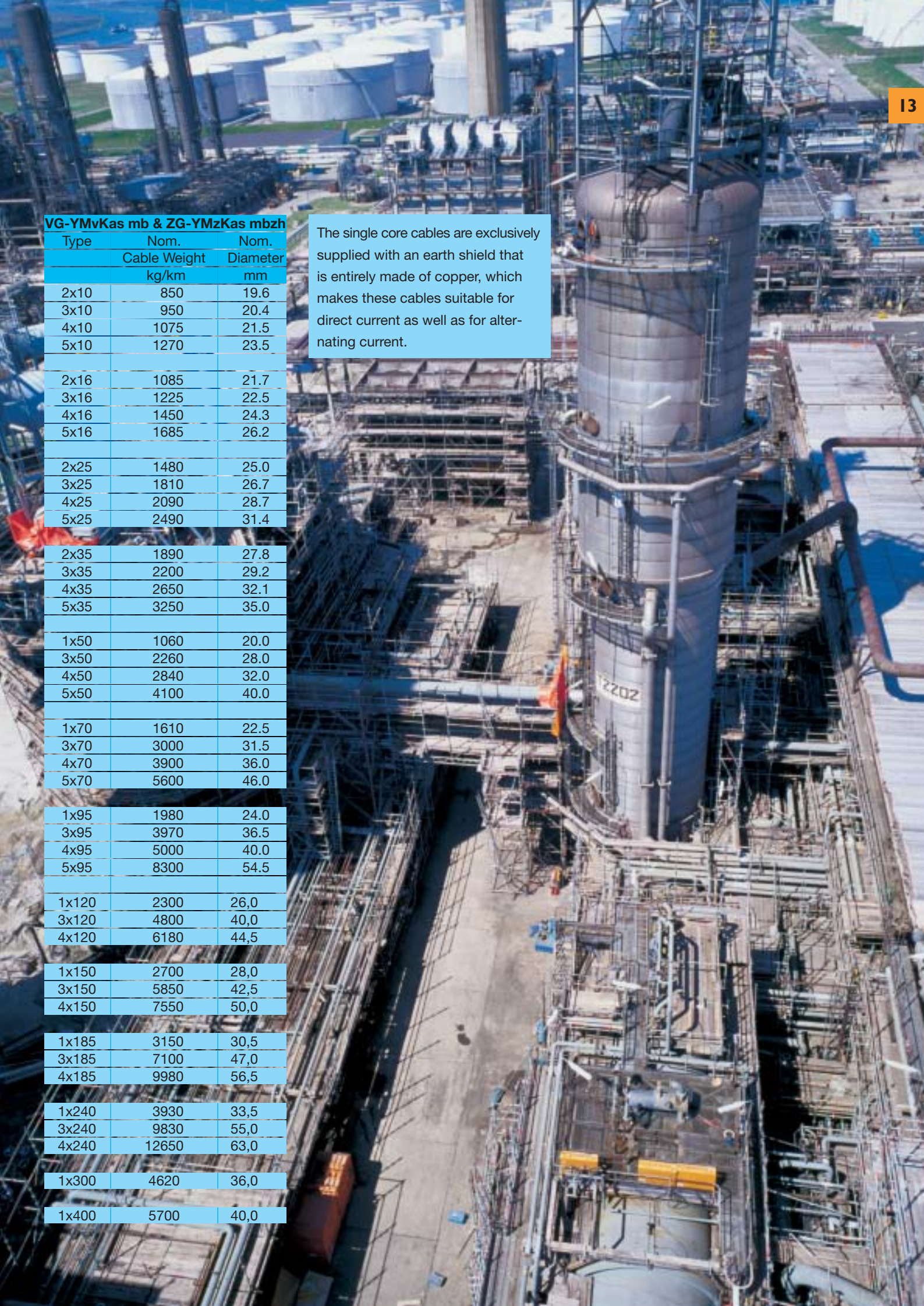
inner sheathing:
HFFR compound

armouring:
round or flat (dependent on the diameter of the cable) galvanised steel wire combined with copper wire and an open counter-spiral of galvanised steel band

outer sheathing:
HFFR compound

colour of the sheathing:
grey

Available in a fire-resistant construction (180 minutes) on request.



VG-YMvKas mb & ZG-YMzKas mbzh

Type	Nom. Cable Weight kg/km	Nom. Diameter mm
2x10	850	19.6
3x10	950	20.4
4x10	1075	21.5
5x10	1270	23.5
2x16	1085	21.7
3x16	1225	22.5
4x16	1450	24.3
5x16	1685	26.2
2x25	1480	25.0
3x25	1810	26.7
4x25	2090	28.7
5x25	2490	31.4
2x35	1890	27.8
3x35	2200	29.2
4x35	2650	32.1
5x35	3250	35.0
1x50	1060	20.0
3x50	2260	28.0
4x50	2840	32.0
5x50	4100	40.0
1x70	1610	22.5
3x70	3000	31.5
4x70	3900	36.0
5x70	5600	46.0
1x95	1980	24.0
3x95	3970	36.5
4x95	5000	40.0
5x95	8300	54.5
1x120	2300	26,0
3x120	4800	40,0
4x120	6180	44,5
1x150	2700	28,0
3x150	5850	42,5
4x150	7550	50,0
1x185	3150	30,5
3x185	7100	47,0
4x185	9980	56,5
1x240	3930	33,5
3x240	9830	55,0
4x240	12650	63,0
1x300	4620	36,0
1x400	5700	40,0

The single core cables are exclusively supplied with an earth shield that is entirely made of copper, which makes these cables suitable for direct current as well as for alternating current.

VO-YLK mb/VG-YLK mb

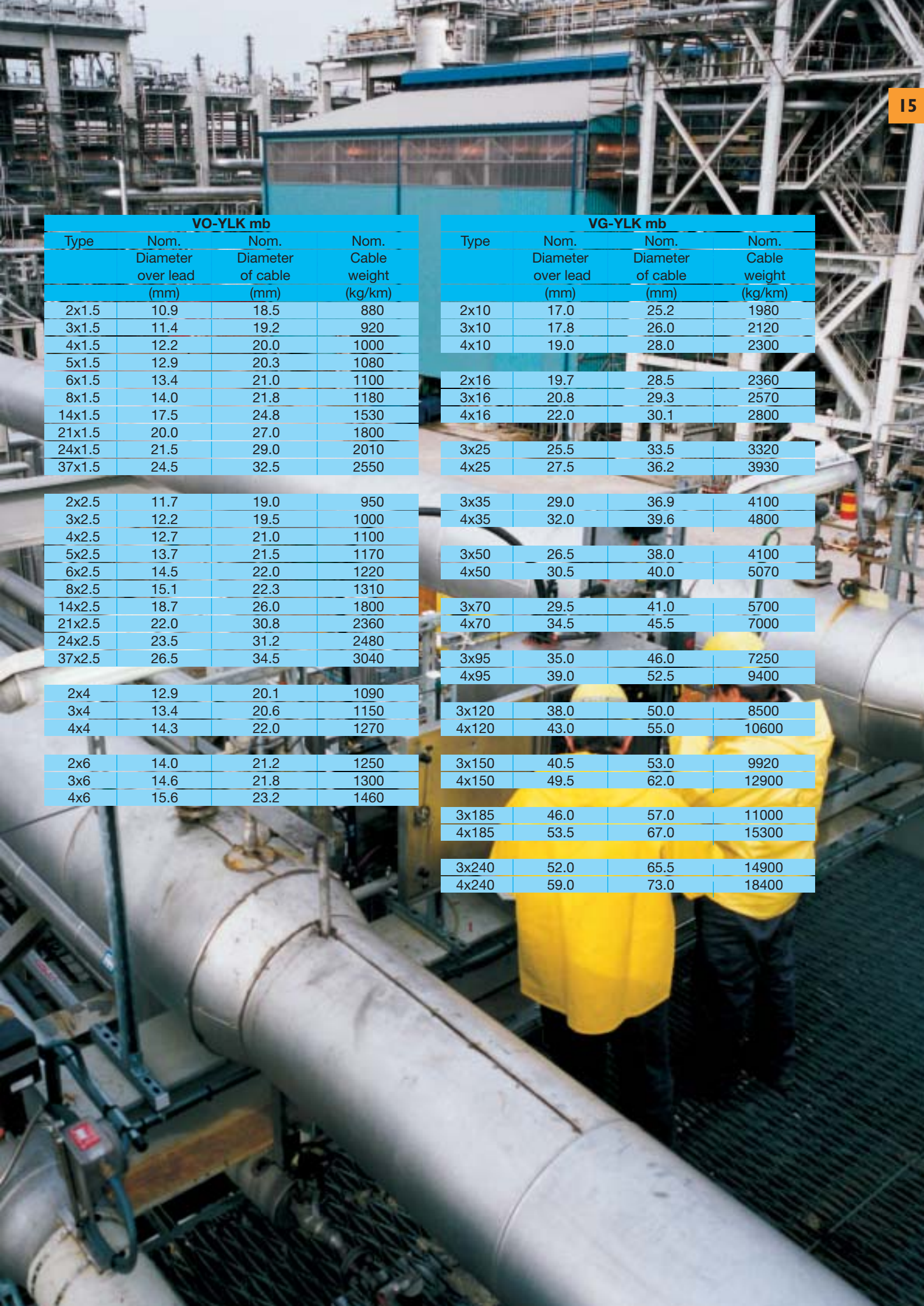
Owing to the applied lead covering the Twenkaplus YLK cables can be used in polluted surroundings.

Construction:VO-YLK mb

conductors:
pure electrolytic copper
insulation:
Twenkaplus XLPE
filling:
PVC compound (in sector shaped conductors and multicore cables (n>5) the core is taped with synthetic tape)
inner sheathing:
PVC
earth litze:
tinned copper
lead covering
inner sheathing:
PVC
armouring:
braiding with round galvanised steel wire
outer sheathing:
PVC flame-retardant
colour of the sheathing:
grey

Construction:VG-YLK mb

conductors:
pure electrolytic copper
insulation:
Twenkaplus XLPE
filling:
PVC compound (in sector-shaped conductors and multicore cables (n>5) the core is taped with synthetic tape)
inner sheathing:
PVC
earth litze:
tinned copper
lead covering
inner core:
PVC
armouring:
round or flat (dependent on the diameter of the cable) galvanised steel wire and an open counter-spiral of galvanised steel band
outer sheathing:
PVC flame-retardant
colour of the sheathing:
grey



VO-YLK mb

Type	Nom. Diameter over lead (mm)	Nom. Diameter of cable (mm)	Nom. Cable weight (kg/km)
2x1.5	10.9	18.5	880
3x1.5	11.4	19.2	920
4x1.5	12.2	20.0	1000
5x1.5	12.9	20.3	1080
6x1.5	13.4	21.0	1100
8x1.5	14.0	21.8	1180
14x1.5	17.5	24.8	1530
21x1.5	20.0	27.0	1800
24x1.5	21.5	29.0	2010
37x1.5	24.5	32.5	2550
2x2.5	11.7	19.0	950
3x2.5	12.2	19.5	1000
4x2.5	12.7	21.0	1100
5x2.5	13.7	21.5	1170
6x2.5	14.5	22.0	1220
8x2.5	15.1	22.3	1310
14x2.5	18.7	26.0	1800
21x2.5	22.0	30.8	2360
24x2.5	23.5	31.2	2480
37x2.5	26.5	34.5	3040
2x4	12.9	20.1	1090
3x4	13.4	20.6	1150
4x4	14.3	22.0	1270
2x6	14.0	21.2	1250
3x6	14.6	21.8	1300
4x6	15.6	23.2	1460

VG-YLK mb

Type	Nom. Diameter over lead (mm)	Nom. Diameter of cable (mm)	Nom. Cable weight (kg/km)
2x10	17.0	25.2	1980
3x10	17.8	26.0	2120
4x10	19.0	28.0	2300
2x16	19.7	28.5	2360
3x16	20.8	29.3	2570
4x16	22.0	30.1	2800
3x25	25.5	33.5	3320
4x25	27.5	36.2	3930
3x35	29.0	36.9	4100
4x35	32.0	39.6	4800
3x50	26.5	38.0	4100
4x50	30.5	40.0	5070
3x70	29.5	41.0	5700
4x70	34.5	45.5	7000
3x95	35.0	46.0	7250
4x95	39.0	52.5	9400
3x120	38.0	50.0	8500
4x120	43.0	55.0	10600
3x150	40.5	53.0	9920
4x150	49.5	62.0	12900
3x185	46.0	57.0	11000
4x185	53.5	67.0	15300
3x240	52.0	65.5	14900
4x240	59.0	73.0	18400

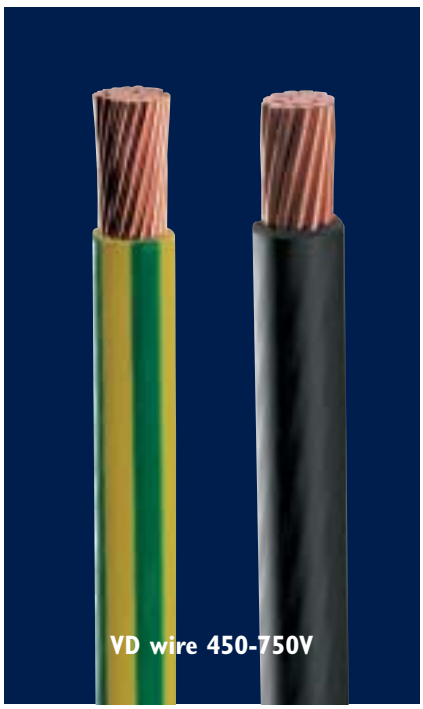
XMvK 450/750 V

The XMvK replaces the VMvK for 100% and can therefore be used for light, mainly simple connections, as for example for lighting and wall sockets. The PVC outer sheathing meets the fire test according IEC 332-1. The Twenkaplus XMvK is provided with KEMA KEUR and the quality mark KCQ (KEMA Certified Quality). The construction is according the KEMA standard K42C-07 and the current capacity according NEN 1010 as included in tabular form on another page in this brochure.

Construction: XMvK

conductors:
solid pure electrolytic copper
insulation:
Twenkaplus XLPE
filling:
PVC compound
sheathing:
PVC
colour of the sheathing:
grey

XMvK		
Type	Nom. Cable weight kg/km	Nom. Diameter mm
2x1.5	10	8.0
3x1.5	12	8.3
4x1.5	13	9.1
5x1.5	16	9.8
2x2.5	13	8.7
3x2.5	15	9.2
4x2.5	18	9.9
5x2.5	22	10.8



VD Installation wire 450/750 V

VD Installation wires are used as wiring in fixed and protected situations as on the inside of appliances, switch boxes and control panels or in pipage or skirting-board systems that have been laid in sight or in a wall.
The VD wire is standardly supplied with PVC insulation and can be applied up to a maximum operating temperature of 70 °C. Special PVC types will be used for higher operating temperatures; for example in the case of assembly wire, suitable for a temperature of 90 °C, insulation material of the PVC 105 type will be applied.

Because special PVC compounds are used, the wire is extremely easy to use for pulling through pipes.
VD wire meets the requirements that have been established in the standard NEN 3621. The wires are supplied with the KEMA-KEUR specification.

Construction: VD 450/750 V

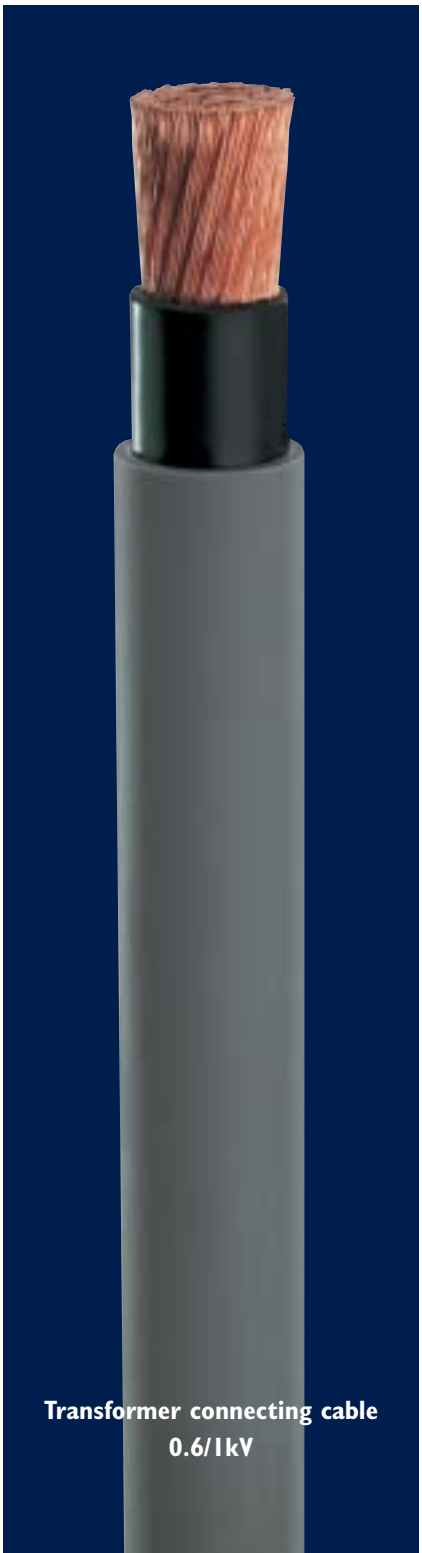
conductors:
solid or stranded pure electrolytic
copper insulation:
PVC

Available in the HFFR version (code ZD) on request.

VD installation wire			
Type mm²	Conductor resistance Ω/km	Nom. Cable weight kg/km	Nom. Diameter mm
4	4.61	47	3.9
6	3.08	67	4.4
10	1.83	120	6.1
16	1.15	175	7.2
25	0.727	275	8.9
35	0.524	370	10.1
50	0.387	490	11.7
70	0.268	700	13.6
95	0.193	975	15.9
120	0.153	1215	17.5
150	0.124	1475	19.9
185	0.0991	1850	21.6
240	0.0754	2370	25.0
300	0.0601	2990	27.3
400	0.0470	3880	31.0

TMzK mbzh connecting cables

For installations where a small bending radius or a high degree of flexibility is required, as for example when connecting transformers, the transformer connecting cable has been developed. The cables have a single core and the conductor has been constructed according IEC 228 grade 5. The chosen insulation is a flexible thermoplastic rubber compound with a sheathing of HFFR compound. This cable contains no halogen or heavy metals.



Transformer connecting cable
0.6/1kV

Construction: TMzK mbzh transformer connecting cable

conductor:

flexible, pure electrolytic copper (round)

insulation:

thermoplastic rubber compounds

heathing:

HFFR compound

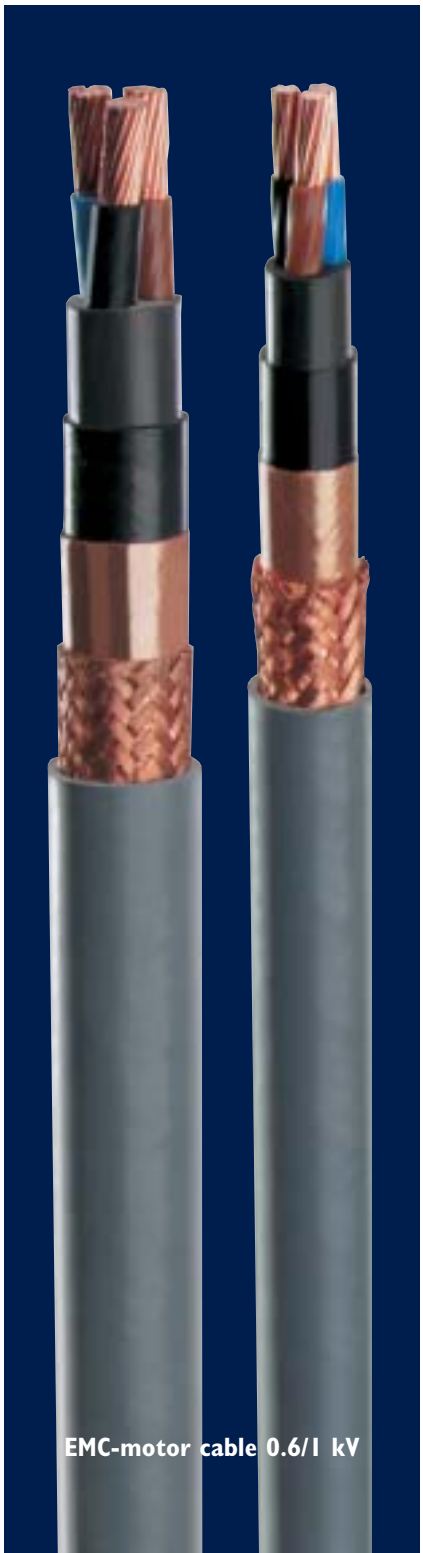
colour of sheathing:

grey

TMzK mbzh transformer connecting cable					
Conductor (mm^2)	Diam. Cu (mm)	Nom. Diam. of insulation (mm)	Nom. Diam. of cable (mm)	Nom. Cable weight (kg/km)	Max. resistance 20 °C (Ω/km)
70	12.0	15.0	18.2	900	0.272
95	14.5	17.8	21.0	1100	0.206
120	16.5	19.8	23.3	1300	0.161
150	18.0	21.8	25.4	1650	0.129
185	20.0	24.0	27.7	1950	0.106
240	23.0	27.0	31.2	2700	0.0801
300	26.0	30.4	34.6	3200	0.0641

VS-YMvKafas mb EMC motor cable

Electromagnetic fields are efficiently being utilised on a large scale. Apart from the efficient use of this phenomenon, these fields can also cause interferences. The influence of these fields on installations and systems is called Electromagnetic Interference (EMI). To set a limit to these interferences, the EMC-directive for installations and systems has been drawn up on EEC level.
The conditions for the Electromagnetic Compatibility (EMC) of installations and systems are stated in this directive. It is effective since 1 January 1996.



EMC-motor cable 0.6/1 kV

Operating systems and automation systems are very sensitive to EMI. Possible causes for interference are for example the feeder cables of frequency-controlled motors. The fact is that with frequency control, higher frequencies occur as well apart from the desired frequency. These so-called “higher harmonics” can interfere with other systems in their surroundings. To prevent this, the feeder cables need to have a low transfer impedance (or coupling impedance). According to specification K149 the KEMA has drawn up for this, the transfer impedance for a maximum of 100 MHz may not exceed 100 mΩ/m.

To achieve this TKF has developed a feeder cable with a special shielding. This shield consists of a sophisticated copper braiding in combination with a copper tape. With this construction, the cable is highly absorbent against interferences caused by EMI. Since the connection is also very important, the coppertape is cut off in a special EMC-turnbuckle on completion In this turnbuckle the braiding is earthed all around. The earthing has to be applied to both ends of the cable and serves as a protection as well.

Construction: VS-YMvKafas mb

conductors:
stranded, pure electrolytic copper (round)
insulation:
Twenkaplus XLPE
filling:
a special PVC filling compound over the stranded cores
inner core:
PVC compound
shielding:
a complex of copper tape with a braiding of copper wires around it
outer sheathing:
PVC flame-retardant
colour:
standard grey

Characteristics:

Transfer impedance: max. 100 mΩ/m, measured at 100 MHz according IEC 96-1.

For operating capacity, self-inductance and conductor resistance, see the tables of the general electrical information about the Twenkaplus cables.

The fact that the loads are based on 50 Hz will have to be taken into account. Higher harmonic currents have been disregarded.

Type	Nom. Diameter of the copper shield in mm^2	Nom. Cable weight kg/km	Nom. Diameter of cable in mm
3 x 2.5	2.5	400	15.1
3 x 4	4	480	16.5
3 x 6	6	600	18.0
3 x 10	10	870	21.0
3 x 16	16	1150	23.5
3 x 25	16	1590	27.5
3 x 35	16	2000	31.0
3 x 50	25	2700	35.0
3 x 70	35	3600	40.0
3 x 95	50	4600	45.0
3 x 120	60	5800	50.0
3 x 150	75	7400	55.0

THE TWENTSCHE KABELFABRIEK, A QUALITY FIRM WITH A CABLE PROGRAMME FOR EVERY CONCEIVABLE APPLICATION

The Twentsche Kabelfabriek (TKF), founded in 1930, has grown into a leading producer of quality cables, and offers a complete range of cables for every conceivable application.

With a market-oriented management we keep a close track of market and technical developments. Decisive product development, focusing on constantly improving and professionalizing, results in new cable designs, offering exactly those properties meeting the requirements and needs of the market.
TKF's intrinsic quality can be glimpsed in its ample awareness of the importance of investing in skilled employees and in ultra-modern production technologies. This quality can also be seen in the high-quality approach organized in accordance with the NEN/ISO-9001 standard and in the multitude of cables bearing the KEMA or KCQ quality assurance label.
Furthermore TKF has officially been certified for its environmental policy to be in accordance with standard EN/ISO 14001.

A flexible organizational form guarantees fast and punctual delivery: our world is our bond. For many years now TKF has been a constant factor in a sea of change, one upon which its customer have been able to build. This shows TKF as a reliable partner for a long-term business relationship, something, which is of benefit to all concerned.

Please contact our Sales Department for more information or for questions concerning Twenkaplus cables as well as our other range of cables.

BV TWENTSCHE KABELFABRIEK

TKF: quality cables for every conceivable application

BV Twentsche Kabelfabriek, Spinnerstraat 15, P.O. Box 6, 7480 AA Haaksbergen
The Netherlands, telephone +31(0)53 573 22 55, fax +31(0)53 573 21 84

printed in the Netherlands 98-07/2