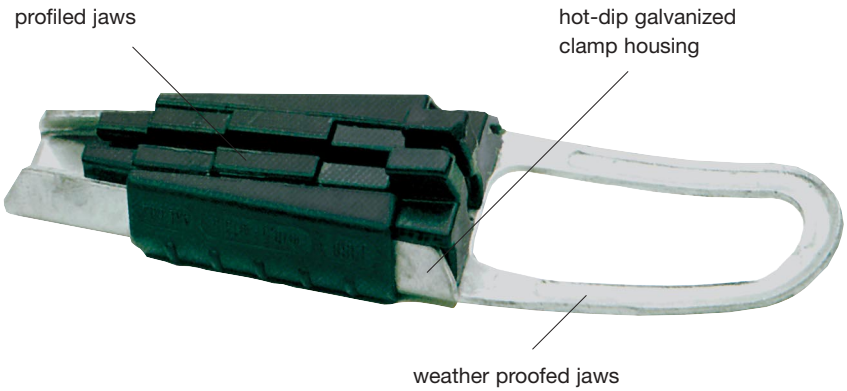
Suspension clamps



Application

These clamps are designed to be used preferably for aerial cables routes with spans up to 50 m. They can also be used inside buildings and in vertical shafts, providing defined fix points by safely accepting the applied loads.

They are contemplary to all cables with a firm and conjugate connection between sheath and stress bearing elements of their support system. This applies especially for „LYNIPORT®-cables“, with feature glass yarns of high tensile strength, directly embedded in the outer sheath.

LYNIPORT®-power cables (N)YZg2Y
LYNIPORT®-telecommunication cables J-2Y2Y(St)(Zg)2Y, A-02YS(St)(Zg)2Y
LYNIPORT®-fiber optic cables A-DF2Y(ZN)2Y-LYNIPORT®

The stress relief system of a LYNIPORT®-cable has standard design, i.e. with a spread of 50 m and a reference temperature of -5 °C a sagging of 0,5 m can be selected. Saggings for different spreads installation temperatures ist related to that. Detailed information available on request.

For shorter connections with aerial cables tensioning of the cable with two suspension clamps at each point is preferable. In this case the suspension hooks have to protrude sufficiently in order to allow free swinging of the clamps with the cable. For long and mostly straight aerial cable routes several supporting points may be arranged between tensioning masts. For large cable diameters and weights, as well as for spans up to 100 m suspension spirals ASP are recommended.

Special characteristics

wide clamping section, easy to install, re-adjustable, compact

type	clamping range mm	dia. of eye mm	dimensions mm	net weight approx. g/piece	tensile load N max.
AKL 801	7,5-10,5	21	174 x 45 x 32	165	4.000
AKL 802	10,5-13,5	21	236 x 61 x 39	395	7.000
AKL 803	13,5-17,5	21	276 x 70 x 47	550	10.000
AKL 804	17,5-22,5	21	437 x 102 x 53	1.350	16.000
AKL 805	22,5-30,0	21	499 x 122 x 60	1.960	18.000

Annex A
Identification of copper, telecom and data cables

Table 1

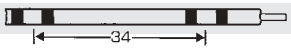
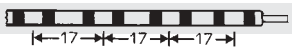
Colour core code – to DIN 47100

1 white	**9** black	**17** white-grey	**25** white-black	**33** green-red	**41** grey-black
2 brown	**10** violet	**18** grey-brown	**26** brown-black	**34** yellow-red	**42** pink-black
3 green	**11** grey-pink	**19** white-pink	**27** grey-green	**35** green-black	**43** blue-black
4 yellow*	**12** red-blue	**20** pink-brown	**28** yellow-grey	**36** yellow-black	**44** red-black
5 grey	**13** white-green	**21** white-blue	**29** pink-green	**37** grey-blue	**From 45** cores onwards repetition of colours
6 pink	**14** blue-green	**22** brown-blue	**30** yellow-pink	**38** pink-blue	
7 blue	**15** white-yellow	**23** white-red	**31** green-blue	**39** grey-red	
8 red	**16** yellow-brown	**24** brown-red	**32** yellow-blue	**40** pink-red	

Note: Also available in type **-JZ** and **-OZ**
*An exception is the 4 core cable. Colour code: white, yellow, brown, blue.

Table 2

The identification of the core is done by ring marking

circuit 1	a-core		without rings
	b-core		rings width approx. 2 mm
circuit 2	a-core		
	b-core		

Basic colours of the core insulation sheath of 5 star quads of a bundle:
1th quad red – 2nd quad green – 3rd quad grey – 4th quad yellow – 5th quad white
The tracer bundles are marked by a red helix.

Annex A
Identification of copper, telecom and data cables

Table 3

The cores of the bundle are marked with the basic colour, additionally with coloured rings.

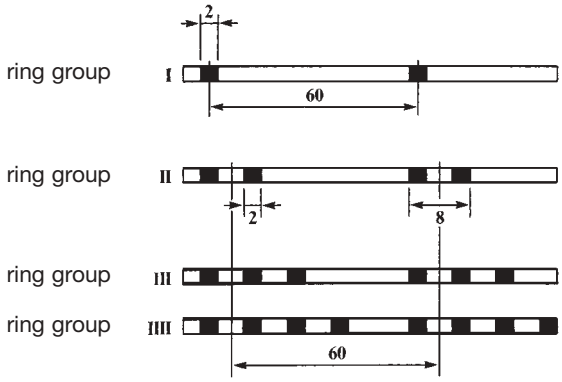
Basic colours of the insulation sheath of the **cores** of the bundle:	blue	red	grey	yellow	green	brown	white	black
Basic colours of the insulation sheath of the **pairs** of the bundle:	blue-red		grey-yellow		green-brown		white-black	

For installation cables with 2 double cores as star quads the colours are as follows:

in circuit 1: a-core blue
b-core red

in circuit 2: a-core grey
b-core yellow

ring group scheme:



Identification of bundles

No. of the bundle	colour of rings	group of rings	helix
1		I	
2	pink	II	–
3		III	
4		IIII	
5		I	
6	orange	II	–
7		III	
8		IIII	
9		I	
10	violet	II	–
11		III	
12		IIII	
13		I	
14	pink	II	–
15		III	
16		IIII	
17		I	
18	orange	II	–
19		III	
20		IIII	

The bundles are clearly to be identified by a number helix.

Annex A
Identification of copper, telecom and data cables

Table 4

1. Pair	white-blue
2. Pair	white-orange
3. Pair	white-green
4. Pair	white-brown

Table 5

Circuit 1	yellow-yellow with ring
Circuit 2	red-red with ring

For cables with 2 star quads the indentification is done by filler tapes.

Table 6

Flexible power cables – to DIN VDE 0293
Core identification of multicore flexible cables

No. of cores	cables with a green-yellow conductor	cables without green-yellow conductor
2	--	brown, blue
3	green-yellow, brown, blue	black, blue, brown
4	green-yellow, black, blue, brown	black, blue, brown, black
5	green-yellow, black, blue, brown, black	black, blue, brown, black, black
6 and more	green-yellow, all other cores black with numbers printed on	all cores black with numbers printed on

Table 7

Power cables – to DIN VDE 0293
Core identification of multicore cables for fixed installations

No. of cores	with green-yellow conductor	without green-yellow conductor	with concentric conductor
2	green-yellow, black	black, blue	black, blue
3	green-yellow, black, blue	black, blue, brown	black, blue, brown
4	green-yellow, black, blue, brown	black, blue, brown, black	black, blue, brown, black
5	green-yellow, black, blue, brown, black	black, blue, brown, black, black	all cores black with numbers on it
6	green-yellow, all other cores black	all cores black	all cores black
and more	with numbers printed on	with numbers printed on	with numbers printed on

Table 8

Possible colour code – acc. to DIN VDE 0293

0	green-yellow	**6**	pink
1	black	**7**	orange
2	blue	**8**	white
3	brown	**9**	red
4	grey	**10**	turquoise
5	violet		

Annex B
Type abbreviation
Power cables

This list includes the most common abbreviations. Each single letter have a different significance depending on the position within the cable type abbreviations, which will be explained by examples.

Abbreviation	Explanation	Example
1. Application		
N	Standardized cable	**N**SGAFÖU
(N)	Acc. to standardized type	**(N)**YZg2Y
S	Special type to our factory standards	**S**07RN-F
H	Harmonized cable	**H**07RN-F
T	Cable for submersible pumps	**T**ML
L	FACAB LYNEN	**L**-STN
2. Construction characteristics under outer sheath: conductor insulation		
Y	Polyvinyl chloride (PVC)	(N)**Y**Zg2Y
7Y	Tefzel (ETFE)	L-SB(7**Y**)BQ
2X	Cross-linked polyethylene (VPE)	N**2X**H
B	Ethylene propylene rubber (EPR)	H07**B**Q-F
Q	Polyurethane (PUR)	S07**Q**Q-F
R	Nature and/or styrene-butadiene-rubber	H05**R**R-F
3. Construction characteristics under outer sheath: support element, screenings		
T	Support element of sisal cord	L-S**T**N
C	Concentric copper conductor	N2X**C**H
/3E	Protective conductor equally shared over the insulation sheath of the outer conductor	NSSHÖU 3x70 + 3x35**/3E**
KON	Concentric protective conductor between inner sheath and outer sheath	NSSHÖU 5x2,5/2,5 **KON**
ST	Control cores in a cable	NSSHÖU 3x70 + 3x35/3E+3x2,5 **ST**
C	Screen of tinned copper braid	NY**C**Yö
4. Outer sheath		
Y	Polyvinyl chloride (PVC)-outer sheath	LiYC**Y** F2
2Y	Polyethylene (PE)-outer sheath	(N)YZg**2Y**
H	Halogen-free plastic outer sheath	N2X**H**
R	Nature and/or styrene-butadiene-rubber	H05R**R**-F
N	Chloroprene-rubber	H07R**N**-F

Annex B
Type abbreviation
Power cables

Abbreviation	Explanation	Example
5. Others		
E30	Strong combustible, halogen-free cable with function integrity up to 30 min. to DIN 4102, part 12 (system-test)	NHXH....FE180/**E30**
E90	Strong combustible, halogen-free cable with function integrity up to 90 min. to DIN 4102, part 12 (system-test)	NHXH....FE180/**E90**
FE180	Strong combustible, halogen-free cable with insulation resistance up to 180 min. (3h) to DIN/VDE 0472 part 814	NHXH....**FE180**/E30
SL	sheathed cable	(N)HX**SL**HXÖ
MH	installation cable	NHX**MH**
Ö	oil resistant	NSSH**Ö**U
-O	Cable without green-yellow protective conductor	N2XH-**O**
-J	Cable with green-yellow protective conductor	NHXMH-**J**
-OZ	Cable without green-yellow protective conductor and number printing on the insulation sheath	NSSHÖU-**OZ**
-JZ	Cable with green-yellow protective conductor and number printing on the insulation sheath	NSSHÖU-**JZ**

Annex B
Type abbreviation
Harmonized types

Table 1a

Type of regulations

Abbreviation	Definition of cables to regulations
H	Cable in accordance to the harmonized standard
A	Accepted national cable type

Table 1b

Rated voltage

Abbreviation	Value Uo/U	Short-signs	Value Uo/U
01	100/100 V (<300/300 V) [1]	05	300/500 V
03	300/300 V	07	450/750 V

[1] Only cables with a rated voltage of 100/100 V are harmonized.

Table 2a

Insulation and non metallic outer sheath compounds

Note: The used abbreviations defined a group of compounds, which have similar characteristics of the listed compounds. All specific elements of the defined characteristics for a specified cable type are included in the regulations.

Abbreviation	Compounds
B	Ethylene propylene rubber for a temperature in operation of 90 °C
G	Ethylene vinylacetate
J	Glass fiber braid
M	Mineral
N	Chloroprene rubber (or of the same value)
N2	Special compound of chloroprene rubber for outer sheaths of welding cables to HD 22.6
N4	Chlorsulfone polyethylene
N8	Special polychloroprene rubber compound – water resistant
Q	Polyurethane
Q4	Polyamide
R	Ethylenpropylene rubber or equivalent synthetic elastomere for a temperature in operation of 60 °C
S	Silicone rubber
T	Textile braid over bundled cores, impregnated or not
T6	Textile braid over each core of a multi core cable, impregnated or not
V	PVC, soft
V2	PVC, soft, for a temperature in operation of 90 °C
V3	PVC, soft, for cables used at low temperatures
V4	PVC, soft, cross linked
V5	PVC, soft, oil resistant
Z	Cross linked polyolefin compounds for cables, which produce low corrosive gases and low smoke in case of fire
Z1	Thermoplastic polyolefin compound for cables, which produce low corrosive gases and low smoke in case of fire

Annex B
Type abbreviation
Harmonized types

Table 2 b

Metallic coverings

Abbreviation	metallic sheaths, concentric conductors and screens
C	Concentric copper conductor
C4	Copper screen as braid over the bundled cores

Table 2 c

Special constructive elements
Note: If necessary, these abbreviations have to follow on abbreviations which are selected from table 2a up to 2c

Abbreviation	Constructive elements
D3	Textile support element made of one or more constructive elements, placed in the center of a round cable or divided in a flat cable.
D5	Center shrinkage (no support element, used for lift control cables)

Table 2 d

Specialities
Note: If necessary, these abbreviations have to follow on abbreviations which are selected from table 2a up to 2c.

Abbreviation	Constructive elements
No shorts	Round cable construction
H	Flat type of divisible cables with or without outer sheath
H2	Flat type of non divisible cables
H6	Flat cables to HD 359 or EN 50214 with 3 or more cores
H7	Cable with extruded two layer insulation sheath
H8	Spiral cable

Table 2 e

Conductor material
Note: If necessary, these abbreviations have to follow on abbreviations which are selected from table 2a up to 2c.

Abbreviation	Conductor material
No shorts	Copper
-A	Aluminium

Annex B
Type abbreviation
Harmonized types

Table 2 f

Conductor shape

Note: These abbreviations must follow the abbreviations after a dash (in case of aluminium conductors already included in the abbreviation A), which have been chosen out of the tables 2a up to 2e. For cable types with conductors of different shapes only the abbreviation for the shape of the outer conductor must be shown.

Abbreviation	Conductor shape
-D	Fine stranded conductor for welding cables to HD 22.6
	(Flexibility divergent to HD 383 class 5)
-E	Very fine stranded conductor for welding cables to HD 22.6
	(Flexibility divergent to HD 383 class 6)
-F	Fine stranded conductor of a flexible cable
	(Flexibility to HD 383 class 5)
-H	Very fine stranded conductor of a flexible cable
	(Flexibility to HD 383 class 6)
-K	Fine stranded conductor of a cable for fixed installation
	(If nothing other is required. Flexibility to HD 383 class 5)
-R	Multi stranded round conductor
-U	Solid round conductor
-Y	Lahn stranded conductor

Table 3

Number of cores and nominal cross section of conductors

Abbreviation	Number and nominal cross section of conductors
(Figure)	Number, n, of cores
x	Sign for cable types without green-yellow core
G	Sign for cable types with green-yellow core
(Figure)*)	Nominal cross section s, of conductors in mm^2
Y	Lahn stranded conductor, whose nominal cross section is not determined.

*) It is an option for the countries to add the short “N” for the core indentification with figures (behind the nominal cross section)

General examples	
nxs oder nGs	n cores of s mm^2 nominal cross section
$n_1xs_1 + n_2xs_2$	n_1 cores of s_1 mm^2 nominal cross section + n_2 cores of s_2 mm^2 nominal cross section
nxs_1/s_2	n cores of s_1 mm^2 nominal cross section and concentric conductor of s_2 mm^2 nominal cross section
n_1xs_1	n_1 cores of s_1 mm^2 nominal cross section + n_2 cores of s_2 mm^2 nominal cross section
$+ n_2xs_2/s_3$	and concentric conductor of s_3 mm^2 nominal cross section

Annex B
Type abbreviation
Harmonized types

Practical examples	
4 G 50	Four core cable with green-yellow core and nominal cross section of 50 mm^2
4 x 50	Four core cable without green-yellow core and nominal cross section of 50 mm^2
3 x 50 + 1G25	Four core cable with 3 conductors of nominal cross section of 50 mm^2 and a green-yellow core, which has a reduced conductor of 25 mm^2 nominal cross section
3 x 70/35	Three core cable with nominal cross section of 70 mm^2 and with concentric conductor of 35 mm^2 nominal cross section
2 x Y	Two core cable with lahn stranded conductors

Basic elements of type abbreviations

The type abbreviation must be composed of three parts, which characterize the essential characteristics of a cable:

Part	Basic elements of type abbreviations	see table(s)
1	Reference to standards	1a
	Rated voltage	1b
2	Construction of a cable always in radial steps,	
	started with the insulation compound	2a up to 2d
	then after a dash compound	
	and shape of conductor(s)	2e and 2f
3	Number and nominal cross section of conductors	

Part 1 and 2 of the abbreviations were always written without a gap and create the abbreviation of the cable version of a cable. Part 3 of the abbreviation include specific characteristics for the number of cores and the nominal cross section of a conductor, if required.

A overview of abbreviations and her sequence are listed in table 4.

If two or more abbreviations, which are listed in same column of table 4, have to be used in a specific type abbreviation then they have to be marked in radial steps, starting with the core resp. conductor axis.

Annex B
Type abbreviation
Harmonized types

Table 4

Schedule of abbreviations and the sequence within the abbreviation types[1)]

Part 1		Part 2			
1	2	3	4	5	6
Type of standard	rated voltage	insulation compound	metallic coverings[2]	non metallic outer sheaths[2]	constructive elements and special types
Abbreviation corresponding table(s)					
1a	**1b**	**2a**	**2b**	**2a**	**2a and 2d**
H	01	B	C	B	D3
					D5
A	03	G	C4	G	No
	05	J		J	abbreviation for
	07	M			round
		N, N4		N, N2, N4, N8	cable design
				Q, Q4	H
		R		R	H2
		S		S	H6
				T, T6	H7
					H8
		V, V2		V, V2, V3	
		V3, V4		V4, V5	
		Z, Z1		Z, Z1	

1. If two or more abbreviations, which are listed in the same column of table 4, have to be used in a specific abbreviation, then they have to be marked in radial steps, starting with the core resp. conductor axis.
2. The abbreviations may change their position within the type abbreviation depending to the design of the cable.

Annex B
Type abbreviation
Harmonized types

		Part 3		
7	8	9	10	11
conductor material	conductor shape	number of cores	sign for multiplication	conductor nom. cross section mm^2
2e	**2f**		**3**	
No	-D	1	X	Y
abbreviation	-E	2		0,50
for copper	-F	3	G	0,75
	-H	4		1
-A	-K	5		1
	-R	and s.o.		2
	-U			4
	-Y			6
				10
				16
				25
				and s.o.

V V V

Annex B
Type abbreviation
copper, telecom and data cables

Abbreviation	Explanation of the signs	Example
1. Types of application		
A-	outdoor cable	**A-**2YYBY
AB-	outdoor cable with special construction for lightning protection	**AB-**2YLE2YDB2Y
AJ-	outdoor cable with special construction for protection against interference	**AJ-**2Y(L)2YDBY
AJB-	outdoor cable with special construction for protection against interference and lightning	**AJB-**2Y(L)2YDBY
(A)-	outdoor cable deviating from the standard type	**(A)-**9Y(K)2Y4Y
G-	mining cable	**G-**2YY(Z)Y
GJ-	mining cable with special protection against interference	**GJ-**YMBY
J-	installation cable	**J-**Y(ST)Y
(J)-	installation cable deviating from the standard	**(J)-**Y(ST)Y
JE-	cable for industrial electronics	**JE-**Y(ST)Y
(JE)-	cable for industrial electronics deviating from the standard	**(JE)-**Y(ST)Y
J-F	flat webbed building wire	**J-F**Y
L-	cables with stranded wires for higher mechanical stresses (multicore cables)	**L-**2YYQY
L-	FACAB LYNEN-EIB-Bus cable	**L-**Y(ST)Y
M-	measuring cable	**M-**2YC2Y
RD-	control and instrumentation cable	**RD-**Y(ST)Y
RE-	computer cables	**RE-**2Y(ST)2Y
S-	control cable	**S-**Y(ST)Y
S	signal cable	A-2YYBY...**S**
(S)-	control cable deviating from the standard	**(S)-**Y(ST)Y
T-	distribution cable	**T-**Y(ST)Y
2. Design under the outer sheath: conductor insulation		
H	halogen-free plastic material	J-**H**(ST)H
P	paper or air-spaced insulation	A-**P**MBC
Y	polyvinyl chloride PVC	J-**Y**(ST)Y
YU	flame resistant PVC with LOI ≥ 30	RD-**YU**(ST)YU
YW	heat resistant PVC up to 90 °C	RD-**YW**(ST)YW
2Y	solid polyethylene PE	A-**2Y**(L)2Y
02Y	foamed polyethylene PE	A-**02Y**(L)2Y
02YS	foamed polyethylene with a solid PE sheath (foam-skin)	A-**02YS**(L)2Y
3Y	polystyrol (styroflex)	S-**3Y**(ST)Y
6Y	teflon (FEP)	RD-**6Y**C6Y
9Y	polypropylene (PP)	A-**9Y**(L)2Y
09Y	foam polypropylene	A-**09Y**(L)2Y
09YS	foamed polypropylene with a sheath of unfoamed polyolefin	A-**09YS**(L)2Y

These list contains the most common abbreviations. Single letters have a different meaning, depending on the position within the abbreviations of the cable type, which is described by examples.

Annex B
Type abbreviation
copper, telecom and data cables

Abbreviation	Explanation of the signs	Example
3. Design under the outer sheath: filler, screens, inner sheaths		
A	covering made of Al-wires	A-2Y(ST)**A**2Y
C	screen made of tinned copper wire braid	JE-Y**C**Y
D	covering made of copper wires	A-2Y(ST)**D**2Y
F	filling with petrol jelly	A-2Y**F**(ST)2Y
0F	filling with so-called "FÜLLNIDZ" (filling material with low dielectricum value	
	because of embedded micro-foam-particles)	A-02YS**0F**(L)2Y
(K)	screen made of copper tape; 0,12 mm thick (previous type)	A-2Y**(K)**2Y
(ST)	static screen made of unilateral coated Al-foil with tinned copper drain wire	S-Y**(ST)**Y
TF	dry filler made by swelling yarns	A-02YS**TF**(L)2Y
Y	PVC-inner sheath	G-2Y**Y**(Z)Y
2Y	PE-inner sheath	A-2YF**2Y**(L)2Y
(Z)	strain resistant braid of galvanized, flat steel wires with a defined breaking length	G-2YY**(Z)**Y
4. Outer sheath		
E	corrosion protection sheath (sheath with embedded plastic tape)	A-2YL**E**2Y
H	halogen-free plastic sheath	J-H(ST)**H**
L	aluminium sheath	A-2Y**L**E2Y
(L)2Y	laminated sheath of an aluminium tape coated	
	with plastic foil on one or on both sides and a sheath of PE	A-2Y**(L)2Y**
LD	corrugated aluminium sheath	A-2Y**LD**E2Y
M	lead sheath	A-P**M**BC
MZ	lead sheath with a hardening addition	A-P**MZ**BC
T2Y	supporting strand made of steel with PE sheath („figure 8")	A-2Y**T**2Y
W	corrugated steel sheath	A-P**W**E2Y
Y	polyvinyl chloride sheath (PVC)	J-Y(ST)**Y**
YMB	flame resistant PVC sheath with LOI ≥ 30	JE-Y(ST)**YMB**
YU	flame retardant PVC sheath with LOI ≥ 30	RD-YU(ST)**YU**
YW	heat resistant PVC sheath up to 90 °C	RD-YW(ST)**YW**
YV	reinforced PVC sheath	J-Y(ST)**YV**
2Y	polyethylene sheath (PE)	A-2Y(ST)**2Y**
2YV	reinforced PE sheath	A-2Y(ST)**2YV**
4Y	polyamide sheath (PA)	A-2Y(L)2Y**4Y**
6Y	teflon sheath (FEP)	RD-6YC**6Y**
(ZG)2Y	stress relieving elements made of glass yarn embedded in the PE outer sheath	
	(LYNIPORT®-sheath)	J-2Y2Y**(ZG)2Y**
11Y	polyurethane outer sheath (PUR)	L-24n**11Y**
(ZN)2Y	strain relieving elements made of glass yarn embedded in the PE outer sheath	
	(LYNIPORT®-outer sheath)	A-DQ2Y**(ZN)2Y**

Annex B
Type abbreviation
copper, telecom and data cables

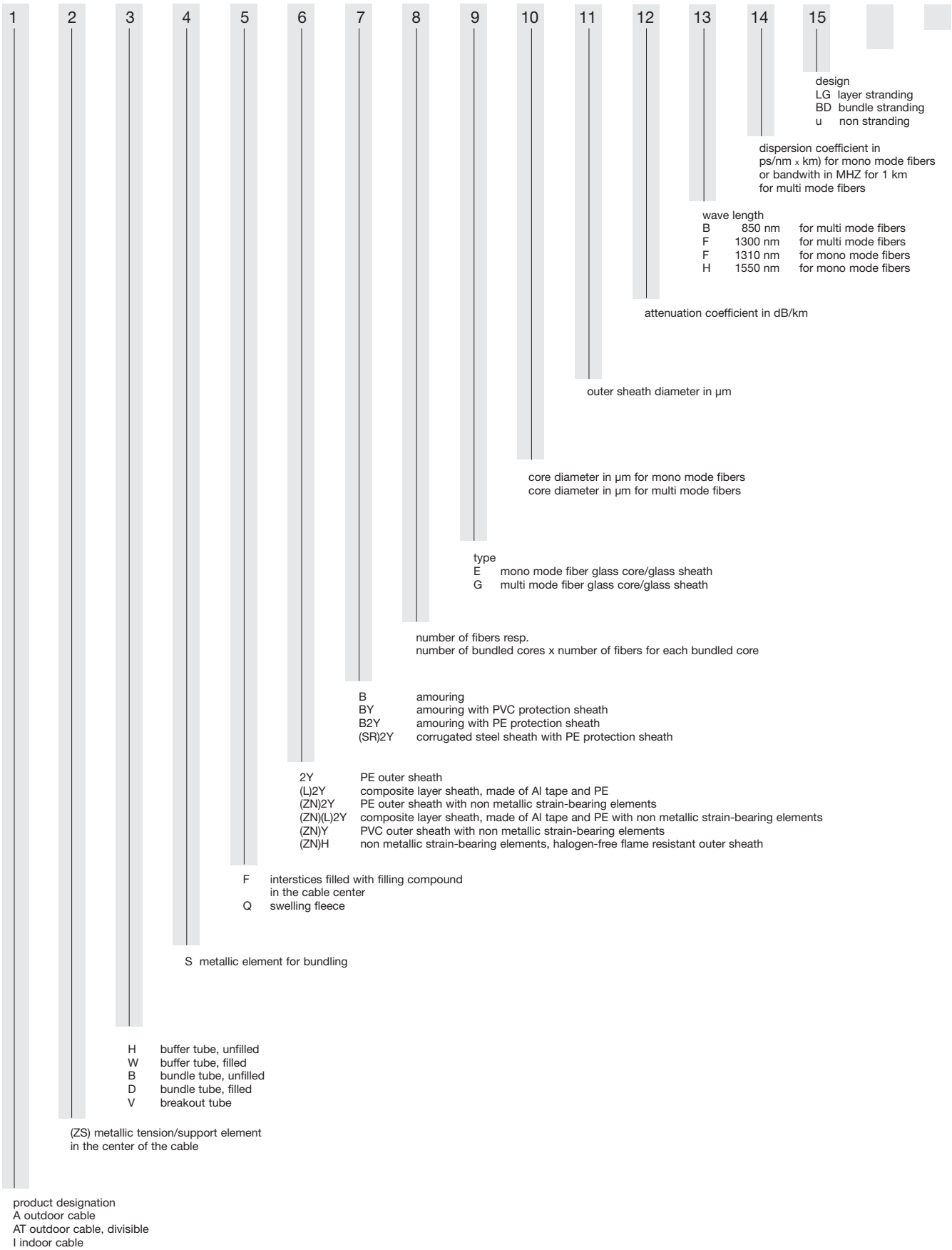
Abbreviation	Explanation of the signs	Example
5. Design over sheath		
A	covering made of aluminium wires	A-2Y(L)2Y**A**2Y
B	armouring made of one or several steel wires, galvanized or covered	
	with mass or a closed layer or round or flat galvanized steel wires	A-2Y(L)2Y**B**2Y
C	protection sheath made of jute or viscous mass	A-PMB**C**
D	covering made of copper wires	A-2Y(L)2Y**D**2Y
iB	induction protective armouring (previous type)	A-2YLEi**B**Y
Q	amouring in the form of a braid, made of flat or round, galvanized steel wires	JE-LiYCY**Q**Y
R	amouring in the form of a braid, made of round, galvanized steel wires	JE-H(ST)H**R**H
(SR)	amouring made of a fluted steel tape (ZETA BON - tape)	A-DF(Z)2Y(**SR**)2Y
Y	PVC protective sheath (inner sheath)	A-PLE**Y**BY
Y	PVC protective sheath (outer sheath)	A-2YYB**Y**
YV	reinforced outer sheath of PVC	JE-Y(ST)Y**YV**
2Y	PE inner sheath	A-PLE**2Y**B2Y
2Y	PE outer sheath	A-PLEB**2Y**2Y
2YV	PE reinforced outer sheath	A-2Y(L)2Y**2YV**
6. Stranding elements/kinds of stranding		
BD	stranding in bundles	...ST III **BD**
BDIMF	bundles in metal foil	...x 2 x 0,6 **BDIMF**
(C)	screen made of a copper wire braid over a pair	L-2Y(**C**)Y...
DM	multiple twin quad (2 pairs stranded with each other)	...x 2 x 1,2 **DM**
DIMF	triples in metal foil	...x 3 x 0,5 **DIMF**
E	tinned copper drain wire	J-02YSC**E**Y
F	star quad with use of phantom circuits (German Railway)	...x 2 x 0,9 **F**
KX	coaxial pair	**KX** 2,6/9,5
LG	stranding in layers	...ST III **LG**
Li	strand	JE-**Li**YCY
PCM	stranding elements for PCM-use (pulse-code-modulation)	...x2x0,8STI**PCM**
PIMF	pair in metal foil	...x 2 x 0,6 **PIMF**
PR	perforated pilot wire	2 x 1 x 0,5 **PR**
ST	star quad with use of phantom circuits (in general)	...x 2 x 0,9 **ST**
ST O	star quad (800 Hz) with from group I up to IV deviating requirements	...x 2 x 0,6 **ST O**
ST I	star quad (800 Hz) without use of phantom circuits for longer distances	
	with increased requirements compared to group II	...x 2 x 0,9 **ST I**
ST II	star quad (800 Hz) with increased requirements compared to group III	...x 2 x 0,6 **ST II**
ST III	star quad with requirements at 800 Hz	...x 2 x 0,6 **ST III**
ST IV	star quad with requirements up to 120 kHz	...x 2 x 1,2 **ST IV**
ST V	star quad with requirements up to 550 kHz	...x 2 x 1,3 **ST V**
ST VI	star quad with requirements up to 17 MHz	...x 2 x 0,6 **ST VI**
TF	stranding elements for carrier frequency use	...x 2 x 1,2 **ST I TF**
VIMF	quads in metal foil	...x 2 x 0,6 **VIMF**
Y	jumper wire of a bare copper conductor with PVC insulation	**Y**
YV	jumper wire of a tinned conductor with PVC insulation	**YV**

Annex B
Type abbreviation
copper, telecom and data cables

Abbreviation	Explanation of the signs	Example
7. Others		
EIB	European Installation Bus	**EIB**-Busleitung
E30	flame retardant, halogen-free cables with	
	with a function integrity up to 30 min. to DIN 4102, part 12 (system-test)	...(ST)H FE180/**E30**
E90	as for E30, but up to 90 minutes	...(ST)H FE180/**E90**
FE180	flame retardant, halogen-free cables with	
	insulation integrity up to 180 minutes (3hours) to DIN VDE 0472, part 814	...(ST)H **FE180**/E30
FRNC	flame retardant, non corrosive	
-JB	cables with green-yellow conductor and “coloured”	
	insulation sheaths to a colour code	LiYCY**-JB**
-JZ	cables with green-yellow conductor and insulation sheaths with numbers printed on	LiYCY**-JZ**
KF	cold resistant cable (here: up to – 40 °C)	L-2YY(Z)Y**KF**40
LSOH	Low smoke zero halogene	
ZHLS	Zero halogene low smoke	RD-H(ST)H**ZHLS**
LOI	Limited Oxygen Index (references value for the degree of flame retardancy)	
TOI	Temperature Oxygen Index (references value for the degree of flame retardancy)	
-OB	cables without green-yellow conductor and “coloured”	
	insulation sheaths to a colour code	LiYCY**-OB**
-OZ	cables without green-yellow conductor and insulation sheaths with numbers printed on	LiYCY**-OZ**
SI	cables with SIMATIC-colour code	JE-Y(ST)Y **SI**
Z	bundles with number helix	JE-Y(ST)Y **Z**
-F2	flame resistant cable (bundle test to belgian standard)	**-F2**
TERMI-POINT-Technique		
	unsoldered connection technique by means of a special tool where the insulation is stripped off on a metal jamb and is put on electrically conductive with a clip (clamp connection) (TERMI: termination) (Mini-, Standard-, Maxi-Termi-Point)	
WIRE-WRAP-Technique		
	unsoldered connection technique by means of a special tool where the stripped-off conductor is wrapped closely around a metal bolt. By this procedure an electrically conductive connection is established (Not suitable for stranded conductors)	

Annex B
Type abbreviation
Fiber optic cables

code design of the type abbreviation
for fiber optic cables acc. to DIN VDE 0888 T3, T4



The items 2, 4, 5 and 7 may be omitted.

The designation for a 24 fiber optic outdoor cable with 6 filled bundled tubes: A-DF(ZN)2Y 6x4 G 50/125 2,5 B 600 0,8 F 800 LG

Annex B
Colour coding
Fiber optic cables

Colour coding of buffer tubes and bundle tubes	
one tube, tracer core	red
other cores	yellow (EM), green (G50), blue (G62,5)
dummies	any, but not yellow, green and blue

Colours of the fiber cores in a bundle tube	
fiber-no.	colour coding
1	red
2	green
3	blue
4	yellow
5	white
6	grey
7	brown
8	violet
9	turquoise
10	black
11	orange
12	pink

Annex C
Construction of stranded conductors
to DIN VDE 0295

Standard construction of stranded conductors (number of wires without obligation)

cross section mm²	stranded conductors DIN VDE 0295 class 2	fine stranded conductors DIN VDE 0295 class 5	very fine stranded conductors DIN VDE 0295 class 6			
0,14	7 x 0,16			18 x 0,10		72 x 0,05
0,25		14 x 0,15		32 x 0,10	65 x 0,07	128 x 0,05
0,34	7 x 0,25	19 x 0,15			88 x 0,07	174 x 0,05
0,38		19 x 0,16		48 x 0,10		
0,50	7 x 0,30	16 x 0,20	28 x 0,15	64 x 0,10	133 x 0,07	256 x 0,05
0,75	7 x 0,37	22 x 0,20	42 x 0,15	96 x 0,10	195 x 0,07	384 x 0,05
1	7 x 0,43	29 x 0,20	57 x 0,15	128 x 0,10	266 x 0,07	512 x 0,05
1,50	7 x 0,52	27 x 0,25	85 x 0,15	191 x 0,10	392 x 0,07	
2,50		45 x 0,25	142 x 0,15	322 x 0,10	651 x 0,07	
4		51 x 0,30	224 x 0,15	511 x 0,10		
6		76 x 0,30	192 x 0,20			
10		77 x 0,40	322 x 0,20			
		203 x 0,25				
16		119 x 0,40	513 x 0,20			
		329 x 0,25				
25		182 x 0,40	798 x 0,20			
		350 x 0,30				
35		259 x 0,40	1121 x 0,20			
		495 x 0,30				

DIN VDE 0295 only stipulates the maximum diameter of the single wire.

cross section mm²	no. of single wires x wire-Ø	Ø of the conductor approx. mm	cross section mm²	no. of single wires x wire-Ø	Ø of the conductor approx. mm
0,14	18 x 0,10	0,50		29 x 0,20	1,30
0,25	14 x 0,15	0,65	1,50	7 x 0,53	1,60
0,34	7 x 0,25	0,75		27 x 0,25	1,60
	19 x 0,15	0,75	2,50	45 x 0,25	2,10
0,50	7 x 0,30	0,90	4,00	51 x 0,30	2,60
	16 x 0,20		6,00	76 x 0,30	3,20
0,75	22 x 0,20	1,15	10,00	77 x 0,40	4,60
1	7 x 0,43	1,30	16,00	119 x 0,40	5,90

Annex C
Construction of wires and stranded conductors
to DIN VDE 0295

Conversion table of AWG wires

AWG No.	wire-Ø mm	wire cross section mm²	conductor resistance max. Ω/km
44	0,050	0,0019	9830
41	0,070	0,0038	4830
40	0,079	0,0050	3700
39	0,089	0,0063	2950
38	0,102	0,0078	2370
37	0,114	0,0095	1960
36	0,127	0,0123	1401
35	0,142	0,0153	1210
34	0,160	0,0201	925
33	0,180	0,0254	730
32	0,203	0,0314	591
31	0,226	0,0415	443
30	0,254	0,0510	371
29	0,287	0,0660	278
28	0,320	0,0804	229
27	0,363	0,1018	181
26	0,404	0,1257	146
25	0,455	0,1590	114
24	0,511	0,2043	84
23	0,574	0,2642	67
22	0,643	0,3217	54
21	0,724	0,3959	43
20	0,813	0,5153	34
19	0,912	0,6504	27
18	1,024	0,8171	21
17	1,151	1,0387	16,9
16	1,290	1,3070	13,5
15	1,450	1,6513	10,6
14	1,628	2,0867	8,5
13	1,829	2,6270	7,3
12	2,052	3,3080	5,75
11	2,304	4,1680	4,54
10	2,588	5,2620	3,59
9	2,906	6,3200	2,99
8	3,268	8,3870	2,25
7	3,665	10,5510	1,79
6	4,115	13,2890	1,42
5	4,620	16,7660	1,12
4	5,189	21,1490	0,89
3	5,827	26,6850	0,70
2	6,543	33,6240	0,56
1	7,348	42,4090	0,44

Stranded conductors of AWG 28-14

AWG-Std.	cross section mm²	solid wire Ø mm	construction of stranded conductor, metric no. of wires x wires-Ø		construction of stranded conductor to AWG standard	
			standard	flexible	standard	flexible
28	0,09	0,320	7 x 0,13	19 x 0,08	7/36	19/40
26	0,15	0,404	7 x 0,16	19 x 0,10	7/34	19/38
24	0,22	0,511	7 x 0,20	19 x 0,13	7/32	19/36
22	0,34	0,643	7 x 0,25	19 x 0,16	7/30	19/34
20	0,56	0,813	7 x 0,32	19 x 0,20	7/28	19/32
18	0,96	1,024	7 x 0,40	19 x 0,25	7/26	19/30
16	1,42	1,300	7 x 0,51	19 x 0,32	7/24	19/28
14	2,25	1,620	7 x 0,64	19 x 0,40	7/22	19/26

* AWG = American Wire Gauge

Annex D
Characteristics of plastic in the cable technique

Designations				Properties (guide values)			
				mechanical			termical
Symbols	chemical	VDE	permissible operating tempera-ture to VDE °C	tensile strength N/mm²	elongation %	resistance to abrasion	behaviour at low temperatures
Thermoplastics							
PVC	polyvinyl chloride compounds	Y	70-105	12,5-25	125-350	average to good	moder. to good
HDPE	high density polyethylene	2Y	70	10-20	400-600	aver. to good	good
LDPE	low density polyethylene	2Y	70	25-40	500-1000	good	good
LLDPE	linear low density polyethylene	2Y	70	15	600	aver. to good	good
VPE	cross-linked polyethylene	2X	90	12,5-20	300-450	aver. to good	good
	foamed polyethylene	02Y	70	8-12	350-500	-	good
PUR	polyurethane	11Y	80	35-50	500-700	very good	good
Elastomere							
SiR	silicone rubber	2G	180	5,0-10,0	300-600	moderate	very good
EPR	ethylene-propylene rubber compounds	3G	90	5,0-10,0	300-500	moder. to aver.	good
EVM	ethylene-vinylacetate-copolymer compounds	4G	110	8,0-12,0	200-350	moder. to aver.	good
CR	polychloroprene compounds	5G	60-90	5,0-20,0	500-800	aver. to good	moderate to good
CM	chlorinated polyethylene compounds	9G	80-100	8,0-20,0	350-650	aver. to good	moderate
CSM	chlorosulfonated polyethylene compounds	6G	100	8,0-20,0	400-700	aver. to good	moderate
Halogen-free polyolefin compounds							
HI1	cross linked	3G	70	> 10	> 150	average	average
HI2	not cross linked	H	70	> 12	> 200	average	moderate
HM2	not cross linked	H	70	> 10	> 200	average	moderate
HM3	cross linked	4G	90	> 10	> 150	average	average
HM4	not cross linked	H	90	> 10	> 200	average	moderate

Note: This table includes compounds, which are used by FACAB LYNEN as standard products.
Other compounds on request

Annex D
Characteristics of plastic in the cable technique

		electrical			chemical resistance (standard values)			
flame resistance	emission of corrosive gases during a combustion	specific volume resistance Ω x cm20°C	dielectric constant 50Hz20°C	factor of loss 50Hz20°C	oils-fats	solvents	diluted acids	water 70 °C
average to good	hydrogen chloride	10^{12}-10^{15}	4,0-6,5	10^{-2}-10^{-3}	moder. to aver.	moderate	good	aver. to good
bad	-	> 10^{16}	2,25-2,6	~10^{-4}	average	aver. to good	very good	very good
bad	-	> 10^{16}	2,4-2,5	~10^{-4}	average	aver. to good	very good	very good
bad	-	~ 10^{16}	2,3	~10^{-4}	average	aver. to good	very good	very good
bad	-	~ 10^{16}	2,3-2,6	~10^{-4}	average	aver. to good	very good	very good
bad	-	~ 10^{17}	~1,6	~10^{-4}	average	aver. to good	very good	very good
moder. to aver.	-	~ 10^{12}	~6,0	~10^{-2}	good	good	moder. to aver.	moder. to aver.
moder. to good	-	~ 10^{15}	~3,0	~10^{-3}	good	bad	moderate	very good
moder. to bad	-	~ 10^{12}-10^{15}	3,0-3,8	~10-2-10-3	moderate to aver.	moderate	good	very good-good
moder. to aver.	-	~ 10^{13}	~6,0	~10^{-2}	moderate to aver.	moderate	mittel	good-mittel average
good	hydrogen chloride	**	**	**	good-very good	mittel	good	moderate
good	hydrogen chloride	**	**	**	good-very good	mittel	good	moderate
good	hydrogen chloride	**	**	**	good-very good	mittel	good	moderate
good	-	-	-	-	average	moderate	good	good
good	-	> 10^{14}	~4,5	~10^{-2}	moder. to bad	average	average	moderate
good	-	> 10^{12}	~5	~10^{-2}	moder. to bad	moderate	moderate	moderate
good	-	-	-	-	good	average	average	moder. to good
good	-	> 10^{12}	~5	~10^{-2}	moder. to bad	moderate	moderate	moderate

Annex E
Cable drums

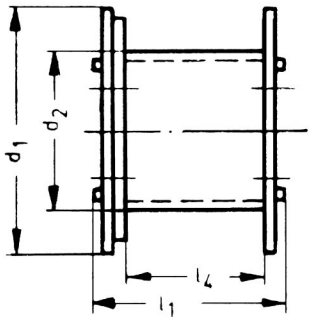
Capacity and size in meter

cable-Ø mm	050/P	051/H	061	071	081	091	101	121	141
4	3280	3450	2990	5600	6980				
5	2100	2270	1930	3700	4530	8230			
6	1470	1510	1330	2460	3080	5600			
7	1050	1140	980	1870	2280	4070	4980		
8	790	860	750	1420	1750	3170	3780		
9	620	680	580	1110	1320	2450	2960	5390	
10	530	550	480	890	1130	2010	2440	4460	
11	410	460	390	750	900	1600	1970	3590	4580
12	350	360	330	590	770	1390	1600	3000	3880
13	300	300	280	490	650	1220	1430	2650	3230
14	250	280	230	460	560	980	1250	2200	2900
15	230	240	210	390	480	910	1080	1950	2450
16		200	170	340	420	790	940	1710	2170
17		190	160	310	380	660	800	1520	1900
18		160	130	260	330	580	710	1350	1690
19				250	280	550	660	1180	1500
20				210	270	480	580	1120	1360
21				200	250	440	540	970	1270
22				190	210	380	470	860	1150
23				150	200	360	450	800	990
24				140	190	350	380	700	950
25				140	160	290	370	680	840
26					150	280	350	650	800
27					140	260	290	560	700
28					140	230	290	540	680
29						220	280	460	650
30						200	260	460	580
31						200	220	440	550
32						190	210	420	530
33						150	200	360	470
34						150	200	350	450
35						150	200	350	420
36						140	160	330	420
37						140	160	330	350
38							150	270	350
39							150	270	330
40							150	250	330

For flat cable is valid: flat cable thickness = round cable diameter

Annex E
KTG-cable drums
Dimensions · weights · capacity

drum code	flange-Ø d_1 mm	core-Ø d_2 mm	overall width l_1 mm	winding width l_4 mm	weight of drum approx. kg	max. capacity kg	
Plastic drums							
050	500	150	456	404	4	100	
070	710	355	510	400	11	250	
080	800	400	510	400	16	350	
090	900	450	680	560	23	400	
100	1000	500	704	560	32	500	
Standard wooden drum							
051	500	150	470	410	8	100	
071	710	355	520	400	25	250	
081	800	400	520	400	31	400	
091	900	450	690	560	47	750	
101	1000	500	710	560	71	900	
121	1250	630	890	670	144	1700	
141	1400	710	890	670	175	2000	
161	1600	800	1100	850	280	3000	
181	1800	1000	1100	840	380	4000	
201	2000	1250	1350	1045	550	5000	
221	2240	1400	1450	1140	710	6000	
250	2500	1400	1450	1140	875	7500	
251	2500	1600	1450	1130	900	7500	
281	2800	1800	1635	1280	1175	10000	
Wooden drums with steel rims							
120	1250	630	890	670	165	1700	V
140	1400	710	890	670	199	2000	
160	1600	800	1100	850	309	3000	
180	1800	1000	1100	840	413	4000	V
200	2000	1000	1050	1060	600	5000	
205	2000	1250	1350	1045	588	5000	
220	2240	1120	1350	1050	750	6000	V
225	2240	1400	1450	1140	753	6000	
255	2500	1400	1450	1140	923	7500	
256	2500	1250	1350	1045	925	7500	
285	2800	1800	1635	1280	1240	10000	



d1 = flange-Ø
d2 = core-Ø
l1 = overall width
l4 = winding width

General terms of delivery and trade

All – including future – deliveries and services shall be solely provided on the basis of the following conditions. The purchasers terms of delivery and trade are herewith contradicted. They shall also not be recognised, if they are not explicitly contradicted again following receipt by the vendor. The terms of sale are deemed as having been accepted on receipt of the goods at the latest. Deviating terms arising out of subsidiary agreements must be confirmed in writing.

1. Offer, order confirmation

Our offers and quotations are subject to change and are not binding for repeat orders. If cost increases arise, we explicitly reserve the right to make a reasonable adjustment to the prices. The price calculations in our order confirmation are based on the respective price lists, whereby the metal prices are calculated in accordance with item 3. These are determined by the metal prices of the workday following receipt of the clarified order. Delivery costs shall be added. The purchaser does not have a right to delivery until the order has been clarified. The order is deemed to be clarified as soon as all items have been mutually agreed, including the delivery date. The prices do not include VAT.

2. Pricing

The prices apply in accordance with INCOTERMS 2000:
EXW ex works
FOB free on board
CIF cost, insurance and freight
The buyer shall be charged with all additional costs incurred due to special dispatch regulations and dispatch by post. Supplements for goods sent by express delivery shall be charged separately. Any collection shall be charged to the buyer.

3. Metal Prices and Calculation

The following are decisive for determining the metal price calculations:
For copper: The quoted price for electrolytic copper, as published in the business newspapers under the heading "non-ferrous metal processor prices" (Del-Notiz), plus delivery costs. If the Del-Notiz deviates from the basis of the standard price, the prices for each 1000 m length shall be increased or reduced by the amount resulting from the multiplication of the given copper number with the copper difference. Supplementary charges or price reductions for copper are always net prices.
For aluminium: The quoted price of the non-ferrous metal processors of aluminium for conducting purposes, as published in the business newspapers. The additional charge or reduced price results from the multiplication of the aluminium number with the aluminium price. Supplementary charges or price reductions for copper are always net prices.
For lead: The quoted price of the non-ferrous metal processors of lead in cables to DIN 17 640, as published in the business newspapers. If this deviates from the basis of the standard price, the prices for each 1000 m length shall be increased or reduced by the amount resulting from the multiplication of the given lead number with the lead price difference. Supplementary charges or price reductions for copper are always net prices.

4. Payment

All invoices are payable as follows, where no alternative arrangements have been made:

4.1. 3% discount for payments received within 10 days. 2% discount for payments received within 30 days or on the 15th of the month following delivery or net on receipt of payment within 60 following the invoice date or after reporting that the goods are ready for dispatch.

4.2. The payment deadlines are calculated from the date the invoice is issued.

4.3. We are unable to grant discount until all other accounts payable and due have been settled. Invoices on account are payable immediately without any deduction.

4.4. In special cases, we reserve the right to demand advance or immediate payment. For all payments, the day of payment is the day on which we can dispose of the sum. The payments must be made exclude any right to setoff and retention. By prior agreement, checks and bills of exchange can also be accepted in lieu of payment. Discount charges and interest must be reimbursed.

4.5. If the buyer fails to comply with our payment terms, all accounts receivable – without regard for any bills of exchange received – shall be due immediately and the buyer shall be in default without requiring a special reminder. The whole of the supplier's account receivable shall also be due immediately in the case of suspension of payments, request for composition or moratorium. Commercial interests of delay shall be charged subject to the reservation of the right to claim other rights.

4.6. If metals (copper, aluminium, lead) are bought ahead at the request of a buyer, without a specific order being placed, we shall invoice the buyer for the metals. The metal invoice is due for immediate payment and without any deductions. After the payment has been received the metal becomes the unsaleable property of the buyer.

4.7. If metals are consigned, these must be made available on the date of the order, however by 8 weeks before the agreed date at the latest.

5. Proprietary reservation

All delivered goods remain our property (proviso goods) until all our demands have been fulfilled, including accounts receivable due in the future, for whatever legal reason, especially our respective balance accounts receivable, even if payments have been made for specially denoted demands. The purchaser may process and sell the goods under their normal terms and conditions of trade and under consideration of the following terms and conditions.

5.1. The authority of the purchaser to sell, process, mix and combine the conditional property in proper business transactions ends, not withstanding any retraction by the vendor permitted at any time, as long as they are not in delay with any debts, however with the cancellation of the purchaser's payments at the latest or if application is made for the opening of bankruptcy proceedings or judicial or non-judicial proceedings with respect to the purchaser's assets or the vendor seeks a moratorium.

5.2. Pledging or transfer of ownership of the proviso goods resp. the transfered debts is not permitted.

5.3. The purchaser does not acquire ownership of the new object in accordance with § 950 BGB (German Civil Code) by processing the proviso goods. The processing is deemed to have been carried out by the purchaser on behalf of the vendor. If the proviso goods are processed with other goods belonging to the purchaser or purchased under simple proprietary reservation in accordance with § 455 BGB, the vendor acquires sole ownership of the processed product. If the proviso goods is processed with other supplied goods, also under extended reservation of proprietary rights, i.e. with exclusion of the legal consequences of § 950 BGB, the vendor acquires co-ownership of the new goods based on the invoiced value of their proviso goods compared with the invoiced value of the other processed goods.

5.4. The purchaser herewith assigns to the vendor all accounts receivable from further sale of the proviso goods and including where the goods have been processed. If, apart from the proviso goods of the vendor, the processed product only contains such objects, which did not belong to the purchaser, and nor were they delivered by simple proprietary reservation rights in accordance with § 455 BGB, the purchaser assigns to the vendor the whole sum due with respect to the purchase price. In the other case, i.e. in the case of concurrence of advanced assignments to several suppliers, the vendor shall be entitled to the respective fraction of the sum due from the purchase price according to an arrangement as provided for under Item 5.3.

5.5. Rights arising out of the proprietary reservation and all the special forms stipulated in these terms and conditions apply until complete release from the ownership obligations, which the vendor has entered into in the interest of the purchaser.

5.6. The purchaser is entitled to collect accounts receivable from the sale until cancellation by the vendor, which can be issued at any time. The vendor shall only make use of their right to cancel in the cases named under items 1 to 10. At the request of the vendor the purchaser is obliged to inform immediately their buyer of the assignment to the vendor – where the vendor does not do this themselves – and to give the vendor the information and documents required to collect the payments.

5.7. If the guaranty provided by the proprietary reservation exceeds the accounts receivable to be secured by 20 %, the vendor shall release fully paid deliveries at their own choice.

5.8. a) Failure to comply with the payment terms or circumstances, which the vendor becomes aware of following the respective conclusion of a contract, and which in the vendor's opinion are suitable for reducing the trustworthiness of the purchaser, shall result in all the vendor's accounts receivable becoming due without consideration of the term of any bills of credit received and credited. Furthermore, in such a case the vendor is entitled not to carry out any outstanding deliveries unless paid for in advance or in exchange for collateral and to withdraw from the contract following a reasonable grace period or to compensation due to non-performance.

5.8. b) The vendor can also refuse the resale and processing of the goods delivered subject to proprietary preservation and demand their return or transfer of indirect ownership at the cost of the purchaser and cancel the purchaser's right to collect payments. In these named cases, the purchaser agrees herewith to the taking away of the delivered goods by the vendor. The purchaser obligates himself to send the vendor a list of the still available goods with reserved proprietary rights, even where these have been processed, and a list of the accounts receivable from third party debtors, including copies of the invoices, as soon as they cancel their payments, and immediately following notification of the payment cancellation. Sums received by the purchaser for the for assigned accounts receivable are to be kept separately until transfered.

5.8. c) The vendor is free to choose the way in which they use these objects, they are not obliged to keep to the provisions of the BGB concerning compulsory disposal.

6. Buyer's Obligation to Surrender

If the buyer come in default according to these terms and conditions of sale, we shall be entitled to demand immediate surrender of the goods with reserved proprietary title **as soon as the purchaser is in default**, and may demand surrender without notice of the owned proviso goods as well as a compensation of the interest of fulfilment for damages caused by default.

7. Packaging

7.1. Cable drums on hire: The goods shall be delivered on drums provided by the firm Kabeltrommel GmbH & Co. KG. Cologne, and to their terms.

8. Under resp. Over Delivery

The manufacturer has the right to supply the ordered quantities with up to 10 % under delivery resp. up to 5% over delivery for **short lengths of**. The proportion of short lengths must not exceed 10 % of the ordered quantity.

9. Terms of Delivery

The terms of delivery given in the offer is subject to being sold. The terms of delivery agreed in the order confirmation run from the day of the full clarification of the order. All provisos arising from unforeseen hindrances, both in our own company as well as those that may result for our suppliers apply for the terms of delivery. The acceptance and execution of orders shall take place subject to the possibility of procuring the necessary raw materials. The notification of readiness to dispatch (i.e. readiness to load) shall be deemed the same as to delivery.

10. Passing of Risk

All risks pass to the buyer when the dispatch (goods and packaging) leave the company or are reported ready for dispatch or collection, even if the dispatch location is not the place of performance, if no other terms of delivery are arranged (for example FOB).

11. Warranty

The supplier's products are state of the art and comply with the relevant technical standards. The buyer can only make claims due to an obvious defect in the goods within two weeks. In addition, we grant a warranty for the case of immediately reported uselessness of the goods as a result of proven material defects or manufacturing defects.

For cables, bare conductor material and fittings 3 years following commissioning or delivery, however such that we shall improve or replace the damaged piece of cable. Other claims are precluded especially for compensation for consequential damages. We can refuse to give a guarantee in the case of delayed payment and withdrawal of credit. Replaced goods become our property. Defects in cables can only be complained of on the basis of cable testing, if they are tested before being installed and within one month of delivery. Tension tests are to be carried out on random samples; the cable is deemed in good order if 2/3 of the random samples have adequate values.

12. Applications Technology Advice

Our advice, e.g. in the form of publication, information and details concerning the data, suitability and use of our products, is established by means of measurements, laboratory investigations or processing trials carried out to the best of our knowledge to state of the art technological standards. However, it is non-binding and does not release the purchaser from their duty to test these products themselves with respect to their suitability for the intended processes and purposes. This also applies for the respective proprietary rights. Advice or a recommendation provided by us shall not justify any contractual legal relationship, or a subsidiary obligation to the purchase agreement, so that we are not liable for such activity. Nevertheless, should liability casting doubts upon, this shall be limited to the same extent as justified defects complaints. If the purchaser is issued analyses data or product specifications supplied by them are checked, such notifications or details of the results of the checks shall not represent assured product properties. Instead, the above paragraph shall apply accordingly.

13. Third Party Proprietary Rights

The buyer bears all the risks, if third parties are injured in the case of delivery to drawings or other details provided by the buyer.

14. Dimensional and Weight Information

All information concerning the diameters and weights of the products is non-binding and **structural & dimensional deviations** are deemed approximate. We reserve the right to make structural & dimensional product changes due to fabrication or raw material reasons.

15. Returns

Returns shall only be accepted by written mutual arrangement.

16. Call Off Orders

In the case of call off orders, the buyer obligates that the deadline for the deliveries is within max. 12 months and the goods are delivered complete. If no other explicit arrangements are made, calls must be made within 6 months. If the call-up deadline is not complied, the supplier has the right to insist on payment and acceptance.

17. Place of Performance and Venue

Eschweiler, where permitted by law.

18. Validity

So far as the above terms and conditions do not make provision for alternative arrangements or should any of the individual terms and conditions given above be invalid, the respective latest version of the general terms and conditions of delivery for Electrical Industry shall apply. The buyer's deviating delivery terms are explicitly precluded.

Issued: January 2003