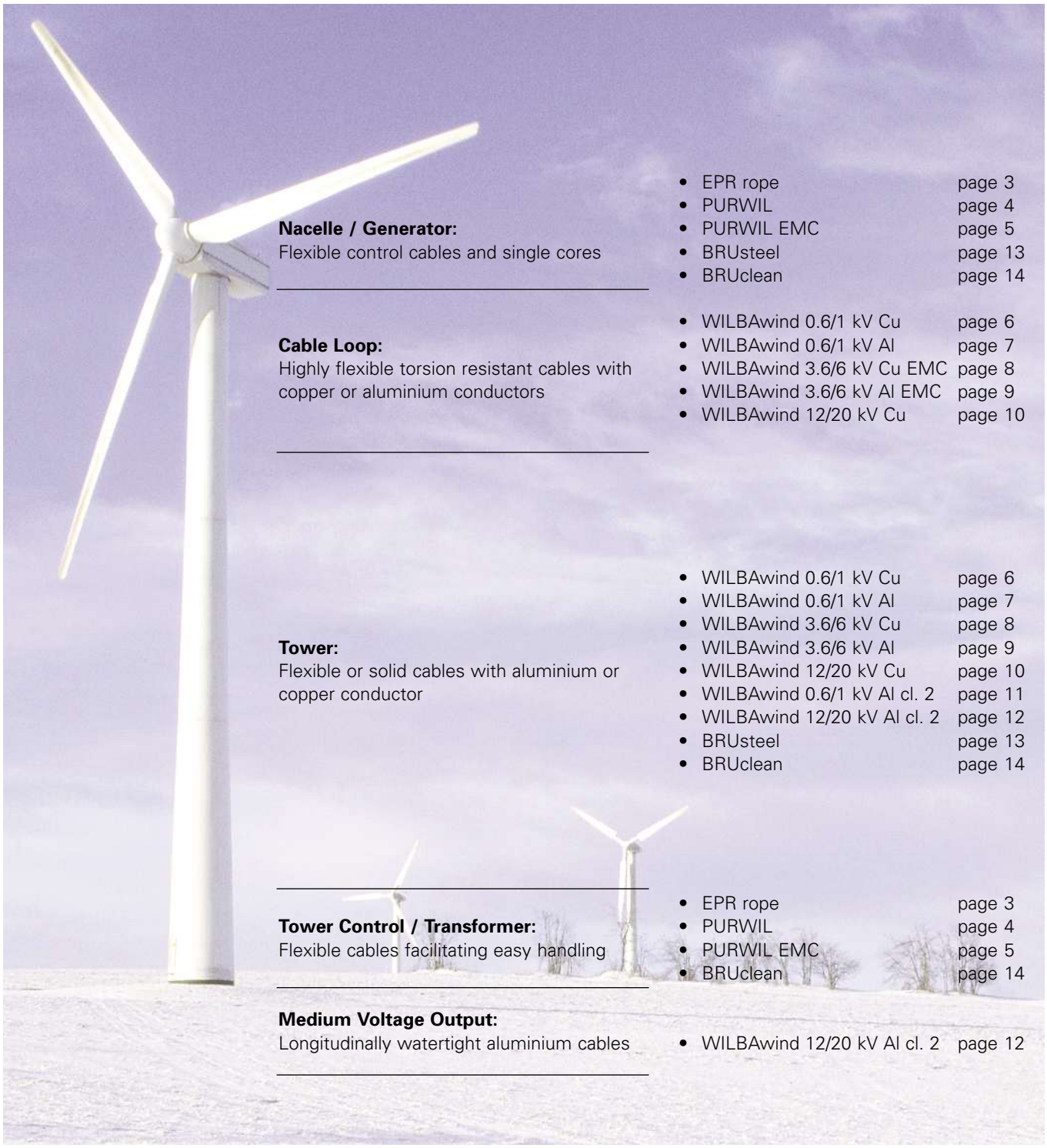
Flexible cables for the use in wind energy plants.

BRUGG CABLES
Well connected.

WILBAwind:
From the initial idea through customer-focused engineering to successful implementation.

Special cables designed for the use in wind energy plants for the transmission of signals and power, low- and medium voltage.



Nacelle / Generator:
Flexible control cables and single cores

Cable Loop:
Highly flexible torsion resistant cables with copper or aluminium conductors

Tower:
Flexible or solid cables with aluminium or copper conductor

Tower Control / Transformer:
Flexible cables facilitating easy handling

Medium Voltage Output:
Longitudinally watertight aluminium cables

EPR rope, flex, single core

Flexible EPR rope with cross-linked insulation **S1B-F**

Application:
For the cabling in switch cabinets, in tower and in nacelle control.

Construction:
- Cu cord flex, class 5 as per IEC 60228
- EPR insulation

Description:
- very robust and endurable
- halogen free
- very good flexibility at low temperatures
- very good oil and petrol resistance
- resistance to ozone and weathering
- nominal voltage U_0/U 0.6/1 kV
- min. bending radius 8 x D (D = outer Ø)

Temperature range:
- - 40 °C ... + 90 °C
- short term application up to + 110 °C

Applicable standards:
- construction as per SEV TP20B/3C
- in accordance with HD 22.12

Remarks:
- compression cable lugs PKD and PKD-F available
- other types and colours upon request

Technical data

Cross section mm²	Part no.	Conductor-code	Conductor colour	Ø d1 approx. mm	Ø D approx. mm	Cu content kg/km	Weight kg/km
1 x 25	516507	L	brown	7.2	10.0	240	258
1 x 25	516552	L	black	7.2	10.0	240	258
1 x 25	516510	L	grey	7.2	10.0	240	258
1 x 25	516506	N	light blue	7.2	10.0	240	258
1 x 25	516509	PE	green-yellow	7.2	10.0	240	258
1 x 35	516517	L	brown	8.7	11.5	336	355
1 x 35	516518	L	black	8.7	11.5	336	355
1 x 35	516520	L	grey	8.7	11.5	336	355
1 x 35	516516	N	light blue	8.7	11.5	336	355
1 x 35	516519	PE	green-yellow	8.7	11.5	336	355
1 x 50	516554	L	black	10.4	13.6	480	502
1 x 50	516526	N	light blue	10.4	13.6	480	502
1 x 50	516529	PE	green-yellow	10.4	13.6	480	502
1 x 70	516555	L	black	12.2	15.4	672	690
1 x 70	516581	N	light blue	12.2	15.4	672	690
1 x 70	516584	PE	green-yellow	12.2	15.4	672	690
1 x 95	516533	L	black	14.2	17.8	912	955
1 x 95	516586	N	light blue	14.2	17.8	912	955
1 x 95	516589	PE	green-yellow	14.2	17.8	912	955
1 x 120	516534	L	black	16.5	20.1	1152	1200
1 x 120	516591	N	light blue	16.5	20.1	1152	1200
1 x 120	516594	PE	green-yellow	16.5	20.1	1152	1200
1 x 150	516535	L	black	17.8	21.8	1440	1480
1 x 150	516656	N	light blue	17.8	21.8	1440	1480
1 x 150	516659	PE	green-yellow	17.8	21.8	1440	1480
1 x 185	516540	L	black	19.8	24.2	1776	1815
1 x 185	505628	PE	green-yellow	19.8	24.2	1776	1815
1 x 240	516545	L	black	23.0	27.8	2304	2325
1 x 240	505629	PE	green-yellow	23.0	27.8	2304	2325
1 x 300	516546	L	black	25.0	30.2	2880	2890
1 x 300	505666	PE	green-yellow	25.0	30.2	2880	2890

d1 diameter of copper conductor
D diameter over insulation

PURWIL, EPR/PUR

Robust and flexible polyurethane cable

H07BQ-F / S1BQ-F

Application:
For the connection of motors and as power and control cable in tower and nacelle.

Construction:
- Cu cord flex, class 5 as per IEC 60228
- EPR insulation
- PUR jacket

Description:
- very robust and endurable
- halogen free
- very good flexibility at low temperatures
- very good oil and petrol resistance
- resistance to ozone and weathering
- nominal voltage
  1.5 up to 16 mm² (harmonised version)
  U_0/U 450/750 V
  25 mm² up to 120 mm²
  U_0/U 0.6/1 kV
- min. bending radius 10 x D (D = outer Ø)

Temperature range:
- - 40 °C ... + 90 °C
- short term application up to + 110 °C

Applicable standards:
- 1.5 mm² up to 16 mm²
  construction as per HD 22.10
- 25 mm² up to 120 mm²
  construction as per SEV TP20B/3C
- IEC 60754-1 halogen content
- IEC 60754-2 corrosivity of fumes
- HD 22.10 resistance to hydrolysis
- HD 22.2 resistance to ozone

Jacket colour:
- 1.5 mm² up to 16 mm²
  yellow, similar to RAL 1021
- 25 mm² up to 120 mm²
  orange, similar to RAL 2004

Remarks:
- other types and colours upon request

Technical data

Cross section mm²	Part no.	Conductor code	Ø D approx. mm	Cu content kg/km	Weight kg/km
3 x 1.5	518466	LNPE	9.0	43.2	107
4 x 1.5	518354	3LPE	10.1	57.6	136
5 x 1.5	518467	3LNPE	11.0	72.0	162
7 x 1.5	518468	6Lnum+PE[1]	13.3	100.8	209
3 x 2.5	518469	LNPE	10.7	72.0	161
4 x 2.5	518481	3LPE	11.9	96.0	202
5 x 2.5	518355	3LNPE	13.3	120.0	250
4 x 4	518592	3LPE	14.1	153.6	297
5 x 4	518482	3LNPE	15.7	192.0	365
4 x 6	518593	3LPE	16.6	230.4	386
5 x 6	518483	3LNPE	18.4	288.0	475
4 x 10	518594	3LPE	21.7	384.0	665
5 x 10	518484	3LNPE	23.9	480.0	820
4 x 16	518596	3LPE	24.8	614.4	945
5 x 16	518496	3LNPE	27.6	768.0	1195
4 x 25	521316	3LPE[1]	29.5	960.0	1366
5 x 25	521317	3LNPE[1]	33.0	1200.0	1667
4 x 35	521318	3LPE[1]	33.5	1344.0	1840
5 x 35	521319	3LNPE[1]	37.5	1680.0	2310
4 x 50	521320	3LPE[1]	39.4	1920.0	2570
5 x 50	521321	3LNPE[1]	43.8	2400.0	3210
4 x 70	521322	3LPE[1]	44.2	2688.0	3590
5 x 70	521323	3LNPE[1]	49.4	3360.0	4480
4 x 95	521324	3LPE[1]	51.2	3648.0	4850
5 x 95	521325	3LNPE[1]	57.2	4560.0	6060
4 x 120	521326	3LPE[1]	57.0	4608.0	6000

D outer diameter
[1] design not included in HD 22.10

PURWIL EMV, EPR/PUR

Flexible screened polyurethane cable

CH-S07BC4Q-F

Application:
For the connection of motors, in tower and nacelle control as well as for SF 6 switch gear.

Construction:
- Cu cord flex, class 5 as per IEC 60228
- EPR insulation
- tinned copper braid shield
- PUR jacket

Description:
- very robust and endurable
- halogen free
- very good flexibility at low temperatures
- very good oil and petrol resistance
- resistance to ozone and weathering
- nominal voltage U_0/U 450/750 V
- min. bending radius 15 x D (D = outer Ø)

Temperature range:
- - 40 °C ... + 90 °C
- short term application up to + 110 °C

Applicable standards:
- construction as per SEV TP20B/3C

Jacket colour:
- grey, similar to RAL 7011

Remarks:
- other types and colours upon request

Technical data

Cross section mm²	Part no.	Conductor code	Ø D approx. mm	Cu content kg/km	Weight kg/km
3 x 1.5	518513	2Lnum+PE	9.7	79.2	132
4 x 1.5	518514	3Lnum+PE	10.7	96.3	166
5 x 1.5	518520	4Lnum+PE	11.7	114.5	198
7 x 1.5	518521	6Lnum+PE	13.2	146.5	260
12 x 1.5	518522	11Lnum+PE	17.7	256.8	439
16 x 1.5	518523	15Lnum+PE	19.6	324.2	547
21 x 1.5	518524	20Lnum+PE	22.2	405.6	726
3 x 2.5	518530	2Lnum+PE	11.4	116.6	190
4 x 2.5	518531	3Lnum+PE	12.6	164.4	240
5 x 2.5	518532	4Lnum+PE	14.3	191.5	310
7 x 2.5	518533	6Lnum+PE	15.7	247.1	392
4 x 4	518534	3LPE	15.0	227.9	350
5 x 4	518540	3LNPE	16.5	277.5	426
4 x 6	518541	3LPE	17.3	316.7	470
5 x 6	518542	3LNPE	19.1	386.3	579
4 x 10	518543	3LPE	22.5	530.7	800
5 x 10	518544	3LNPE	24.8	644.2	971
4 x 16	518561	3LPE	25.7	781.1	1110
5 x 16	518562	3LNPE	28.4	953.7	1357
4 x 25	518408	3LPE	30.7	1139.5	1580
5 x 25	518409	3LNPE	34.2	1443.3	1989
4 x 35	518410	3LPE	35.0	1610.4	2122
1 x 50	523706	L	17.7	552.1	670
4 x 50	521411	3LPE	40.7	2212.8	2900
5 x 50	521412	3LNPE	45.0	2733.4	3629
1 x 70	523708	L	19.9	756.5	920
1 x 95	523710	L	22.8	1057.2	1260
1 x 120	523712	L	25.3	1304.3	1540
1 x 150	523714	L	27.6	1574.0	1900
1 x 185	523716	L	30.4	2004.1	2330
1 x 240	523718	L	34.5	2541.3	2950

D outer diameter

WILBAwind 0.6/1 kV, Cu, torsion

Halogen free single core low voltage cable EPR/PUR

Application:
EPR/PUR single core cable designed especially for the use between nacelle and tower of wind energy turbines.

Construction:
- Cu cord flex, class 5 as per IEC 60228 torsion resistant construction
- EPR insulation, colour black
- PUR jacket FRNC

Description:
- very robust and endurable
- very good resistance to abrasion
- very good flexibility at low temperatures
- excellent resistance to high temperatures
- halogen free
- flame retardant
- very good oil and petrol resistance
- resistance to ozone and weathering
- nominal voltage U_0/U 0.6/1 kV
- operating voltage max.
  AC U_0/U 0.72/1.2 kV
  DC U_0/U 0.9/1.8 kV
- test voltage 3 kV AC
- min. bending radius 6 x D (D = outer Ø)

Torsion resistance:
- +/- 150° per metre

Temperature range:
- - 40 °C ... + 90 °C
- short term application up to + 110 °C
- in case of a short circuit + 250 °C for 5 s

Jacket colour:
- black, similar to RAL 9005

Applicable standards:
- construction according to VDE 0250-813
- IEC 60332-1 flame retardance
- IEC 60754-1 halogen content
- IEC 60754-2 corrosivity of fumes
- IEC 60811-2-1 resistance to oil
- DIN EN 50396 resistance to ozone
- ISO 4982-2 UV resistance (test method A)

Remarks:
- other types upon request
- version suitable for off-shore applications upon request

Technical data

Cross section mm²	Part no.	Ø d1 approx. mm	Ø D approx. mm	Cu content kg/km	Weight kg/km
1 x 120	525000	19.1	22.1	1060	1340
1 x 150	525001	20.6	23.8	1300	1650
1 x 185	525002	22.6	26.0	1650	1885
1 x 240	525003	26.0	29.6	2120	2405
1 x 300	525004	28.2	32.2	2620	2960

d1 diameter over insulation
D outer diameter

Cross section mm²	Admissible tensile force max. N	Current carrying capacity[1] A		Short circuit current max. kA (1 s)
		freely suspended	in contact with a surface	
1 x 120	1800	489	465	17.1
1 x 150	2250	564	536	21.4
1 x 185	2775	644	612	26.4
1 x 240	3600	776	737	34.3
1 x 300	4500	901	856	42.9

[1] referring to a single cable which is installed with at least 1 x D distance to the next cable under load at + 30 °C

WILBAwind 0.6/1 kV, Al, torsion

Halogen free single core low voltage cable EPR/PUR

Application:
EPR/PUR single core cable designed especially for the use between nacelle and tower of wind energy turbines.

Construction:
- Al cord flex, in accordance with class 5 as per IEC 60228
  special high tensile strength alloy torsion resistant construction
- EPR insulation, colour black
- PUR jacket FRNC

Description:
- very robust and endurable
- very good resistance to abrasion
- very good flexibility at low temperatures
- excellent resistance to high temperatures
- halogen free
- flame retardant
- very good oil and petrol resistance
- resistance to ozone and weathering
- nominal voltage U_0/U 0.6/1 kV
- operating voltage max.
  AC U_0/U 0.72/1.2 kV
  DC U_0/U 0.9/1.8 kV
- test voltage 3 kV AC
- min. bending radius 6 x D (D = outer Ø)

Torsion resistance:
- +/- 150° per metre

Temperature range:
- - 40 °C ... + 90 °C
- short term application up to + 110 °C
- in case of a short circuit + 250 °C for 5 s

Jacket colour:
- black, similar to RAL 9005

Applicable standards:
- construction according to VDE 0250-813
- IEC 60332-1 flame retardance
- IEC 60754-1 halogen content
- IEC 60754-2 corrosivity of fumes
- IEC 60811-2-1 resistance to oil
- DIN EN 50396 resistance to ozone
- ISO 4982-2 UV resistance (test method A)

Remarks:
- other types upon request

Technical data

Cross section mm²	Part no.	Ø d1 approx. mm	Ø D approx. mm	Al content kg/km	Weight kg/km
1 x 185	517325	21.8	25.2	555	775
1 x 240	517326	25.0	28.6	720	1000
1 x 300	517327	27.2	31.2	900	1230

d1 diameter over insulation
D outer diameter

Cross section mm²	Admissible tensile force max. N	Current carrying capacity[1] A		Short circuit current max. kA (1 s)
		freely suspended	in contact with a surface	
1 x 185	1665	503	478	17.0
1 x 240	2160	600	570	22.0
1 x 300	2700	695	660	27.6

[1] referring to a single cable which is installed with at least 1 x D distance to the next cable under load at + 30 °C

WILBAwind 3.6/6 kV, Cu, EMC, torsion

Halogen free shielded single core medium voltage cable

Application:
Single core medium voltage cable designed especially for the use between nacelle and tower of wind energy turbines.

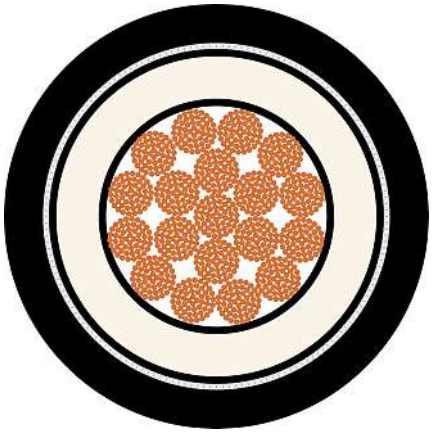
Construction:
- Cu cord flex, class 5 as per IEC 60228 torsion resistant construction
- inner semi-conductive layer
- EPR insulation, colour natural
- outer semi-conductive layer
- Cu shield
- special FRNC jacket

Description:
- very robust and endurable
- very good resistance to abrasion
- good flexibility at low temperatures
- excellent resistance to high temperatures
- halogen free
- flame retardant
- very good oil and petrol resistance
- resistance to ozone and weathering
- nominal voltage U_0/U 3.6/6 kV
- operating voltage max.
  AC U_0/U 4.32/7.2 kV
  DC U_0/U 5.4/9 kV
- test voltage 12 kV AC
- min. bending radius 10 x D (D = outer Ø)

Torsion resistance:
- +/- 100° per metre

Temperature range:
- - 40 °C ... + 90 °C
- short term application up to + 110 °C
- in case of a short circuit + 250 °C for 5 s

Jacket colour:
- black, similar to RAL 9005



Applicable standards:
- construction according to VDE 0276-620
- IEC 60332-1 flame retardance
- IEC 60332-3 non-propagation of fire
- IEC 60754-1 halogen content
- IEC 60754-2 corrosivity of fumes
- IEC 61034 smoke density
- IEC 60811-2-1 resistance to oil
- DIN EN 50396 resistance to ozone
- ISO 4982-2 UV resistance (test method A)

Remarks:
- other types upon request
- version suitable for off-shore applications upon request

Technical data

Cross section mm²	Part no.	Ø d1 approx. mm	Ø D approx. mm	Cu content kg/km	Weight kg/km
1 x 150	upon request	27.6	35.0	1550	2450
1 x 185	upon request	29.6	37.0	1875	2870

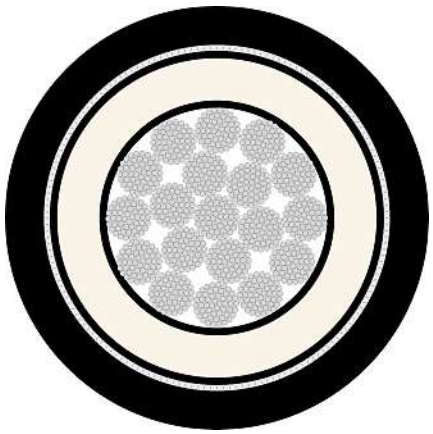
d1 diameter over outer conductive layer
D outer diameter

Cross section mm²	Admissible tensile force max. N	Current carrying capacity[1] A		Short circuit current max. kA (1 s)
		freely suspended	in contact with a surface	
1 x 150	2250	564	536	21.4
1 x 185	2750	644	612	26.4

[1] referring to a single cable which is installed with at least 1 x D distance to the next cable under load at + 30 °C

WILBAwind 3.6/6 kV, Al, EMC, torsion

Halogen free shielded single core medium voltage cable



Application:
Single core medium voltage cable designed especially for the use between nacelle and tower of wind energy turbines.

Construction:
- Al cord flex, in accordance with class 5 as per IEC 60228
  special high tensile strength alloy
  torsion resistant construction
- inner semi-conductive layer
- EPR insulation, colour natural
- outer semi-conductive layer
- Cu shield
- special FRNC jacket

Description:
- very robust and endurable
- very good resistance to abrasion
- good flexibility at low temperatures
- excellent resistance to high temperatures
- halogen free
- flame retardant
- very good oil and petrol resistance
- resistance to ozone and weathering
- nominal voltage U_0/U 3.6/6 kV
- operating voltage max.
  AC U_0/U 4.32/7.2 kV
  DC U_0/U 5.4/9 kV
- test voltage 12 kV AC
- min. bending radius 10 x D (D = outer Ø)

Torsion resistance:
- +/- 100° per metre

Temperature range:
- - 40 °C ... + 90 °C
- short term application
  up to + 110 °C
- in case of a short circuit
  + 250 °C for 5 s

Jacket colour:
- black, similar to RAL 9005

Applicable standards:
- construction according to VDE 0276-620
- IEC 60332-1 flame retardance
- IEC 60332-3 non-propagation of fire
- IEC 60754-1 halogen content
- IEC 60754-2 corrosivity of fumes
- IEC 61034 smoke density
- IEC 60811-2-1 resistance to oil
- DIN EN 50396 resistance to ozone
- ISO 4982-2 UV resistance (test method A)

Remarks:
- other types upon request

Technical data

Cross section mm²	Part no.	Ø D approx. mm	Metal content kg/km Cu	Metal content kg/km Al	Weight kg/km
1 x 150	upon request	34.2	335	450	1520
1 x 185	upon request	36.2	354	555	1720

D outer diameter

Cross section mm²	Admissible tensile force max. N	Current carrying capacity[1] A freely suspended	Current carrying capacity[1] A in contact with a surface	Short circuit current max. kA (1 s)
1 x 150	1350	433	411	13.8
1 x 185	1665	503	478	17.0

[1] referring to a single cable which is installed with at least 1 x D distance to the next cable under load at + 30 °C

WILBAwind 12/20 kV, Cu, torsion

Halogen free multicore medium voltage cable

Application:
Multicore medium voltage cable designed especially for the use between nacelle and tower of wind energy turbines.

Construction:
- Cu cord flex, class 5 as per IEC 60228 torsion resistant construction
- inner semi-conductive layer
- EPR insulation, compound type 3GI3 as per DIN VDE 0207-20
- outer semi-conductive layer
- filling compound type GM1b as per DIN VDE 0207-21
- special FRNC jacket

Description:
- very robust and endurable
- very good resistance to abrasion
- good flexibility at low temperatures
- excellent resistance to high temperatures
- halogen free
- flame retardant
- very good oil and petrol resistance
- resistance to ozone and weathering
- nominal voltage U_0/U 12/20 kV
- operating voltage max.
  AC U_0/U 13.9/24 kV
  DC U_0/U 18/36 kV
- test voltage 29 kV AC
- min. bending radius 10 x D (D = outer Ø)
  (fixed installation 6 x D)

Torsion resistance:
- +/- 100° per metre

Temperature range:
- - 40 °C ... + 90 °C
- short term application up to + 110 °C
- in case of a short circuit + 250 °C for 5 s

Jacket colour:
- black, similar to RAL 9005

Applicable standards:
- construction according to VDE 0250-813
- IEC 60332-1 flame retardance
- IEC 60332-3 non-propagation of fire
- IEC 60754-1 halogen content
- IEC 60754-2 corrosivity of fumes
- IEC 61034 smoke density
- IEC 60811-2-1 resistance to oil
- DIN EN 50396 resistance to ozone
- ISO 4982-2 UV resistance (test method A)

Remarks:
- other types upon request
- version suitable for off-shore applications upon request
- 18/30 kV version in preparation

Technical data

Cross section mm²	Part no.	Ø d1 approx. mm	Ø D approx. mm	Cu content kg/km	Weight kg/km
3 x 35 / 35	517144	22.1	57.9	1250	9400

d1 diameter over the outer conductive layer of a conductor
D outer diameter

Cross section mm²	Admissible tensile force max. N	Current carrying capacity[1] A		Short circuit current max. kA (1 s)
		freely suspended	in contact with a surface	
3 x 35 / 35	2800	170	162	4.27

[1] referring to a single cable which is installed with at least 1 x D distance to the next cable under load at + 30 °C

WILBAwind 0.6/1 kV, Al, cl. 2

Halogen free single core low voltage cable **(N)A2XH**

Application:
FRNC single core cable designed especially for fixed installation in the tower of wind energy turbines.

Construction:
- Al conductor, class 2 as per IEC 60228
- XLPE insulation
  compound type 2XI1 as per HD 604 S1
  colour black
- FRNC jacket
  compound type HM4 as per HD 604 S1

Description:
- very robust and endurable
- very good resistance to abrasion
- resistance to low and high temperatures
- halogen free
- flame retardant
- resistance to UV radiation, ozone and weathering
- nominal voltage U_0/U 0.6/1 kV
- operating voltage max.
  AC U_0/U 0.72/1.2 kV
  DC U_0/U 0.9/1.8 kV
- test voltage 4 kV AC
- min. bending radius 15 x D (D = outer Ø)

Temperature range:
- - 40 °C ... + 90 °C
- short term application up to + 110 °C
- in case of a short circuit + 250 °C for 5 s

Jacket colour:
- black, similar to RAL 9005

Applicable standards:
- construction according to HD 604 S1
- IEC 60332-1 flame retardance
- IEC 60332-3 non-propagation of fire
- IEC 60754-1 halogen content
- IEC 60754-2 corrosivity of fumes
- IEC 61034 smoke density
- ISO 4982-2 UV resistance (test method A)

Remarks:
- other types upon request

Technical data

Cross section mm²	Part no.	Ø d1 approx. mm	Ø D approx. mm	Al content kg/km	Weight kg/km
1 x 150	upon request	17.2	19.8	435	570
1 x 185	upon request	19.2	22.0	537	710
1 x 240	upon request	21.4	24.2	696	890
1 x 300	upon request	24.0	27.0	870	1095
1 x 400	upon request	27.0	30.0	1160	1370

d1 diameter over insulation
D outer diameter

Cross section mm²	Admissible tensile force[1] max. N	Current carrying capacity in air at + 30 °C A		Short circuit current max. kA (1 s)
		single cable, distance 1 x D	installation in trefoil	
1 x 150	4500	431	339	13.8
1 x 185	5550	501	395	17.0
1 x 240	7200	600	472	22.0
1 x 300	9000	696	547	27.6
1 x 400	12000	821	643	36.8

[1] once for installation purposes

WILBAwind 12/20 kV, Al, cl. 2

Longitudinally watertight single core medium voltage cable

NA2XS(F)2Y

Application:
Medium voltage cable for fixed installation in the base of the tower and for direct laying in the ground.

Construction:
- Al conductor, class 2 as per IEC 60228
- inner semi-conductive layer
- XLPE insulation
  compound type DIX8 as per HD 620 S1
- outer semi-conductive layer
- semi-conductive water blocking tape
- shield of copper wires with counter spiral of copper tape
- water blocking tape
- PE jacket
  compound type DMP2 as per HD 620 S1

Description:
- very robust and endurable
- very good resistance to abrasion
- good flexibility at low temperatures
- excellent resistance to high temperatures
- halogen free, UV resistant
- very good oil and petrol resistance
- resistance to ozone and weathering
- nominal voltage U_0/U 12/20 kV
- operating voltage max. 24 kV AC
- test voltage 30 kV AC
- min. bending radius 15 x D (D = outer Ø)

Temperature range:
- - 40 °C ... + 90 °C
- short term application up to + 110 °C
- in case of a short circuit + 250 °C for 5 s

Jacket colour:
- black, similar to RAL 9005
  (upon request with red stripe)

Applicable standards:
- construction as per HD 620 S1
- IEC 60754-1 halogen content
- IEC 60754-2 corrosivity of fumes
- IEC 60811-2-1 resistance to oil
- DIN EN 50396 resistance to ozone
- ISO 4982-2 UV resistance (test method A)

Remarks:
- other types upon request
- longitudinally and laterally watertight version NA2XS(FL)2Y upon request

Technical data

Cross section mm²	Part no.	Ø d1 approx. mm	Ø D approx. mm	Metal content kg/km Cu	Metal content kg/km Al	Weight kg/km
1 x 150 Al / 25	upon request	26.6	35.0	283	435	1310
1 x 185 Al / 25	upon request	28.2	38.0	283	537	1550
1 x 240 Al / 25	upon request	30.4	40.0	283	696	1830
1 x 300 Al / 25	upon request	32.7	44.0	283	870	2140
1 x 400 Al / 35	upon request	35.5	47.0	394	1160	2480

d1 diameter over outer conductive layer
D outer diameter

Cross section mm²	Admissible tensile force[1] max. N	Current carrying capacity for installation in trefoil A in air at + 30 °C	Current carrying capacity for installation in trefoil A in earth at + 20 °C	Reactance at 50 Hz Ohm/km
1 x 150 Al / 25	4500	366	319	0.116
1 x 185 Al / 25	5550	420	361	0.112
1 x 240 Al / 25	7200	496	417	0.108
1 x 300 Al / 25	9000	569	471	0.107
1 x 400 Al / 35	12000	660	535	0.102

[1] once for installation purposes

BRUsteel

Flexible miniature fibre optic cable with metallic armouring and PA jacket

LLK-BST, patent pending

Application:
Extremely rugged fibre optic cable for self-supporting applications and temporary installation in- and outdoors.

Construction:
- fibres with primary coating
- jelly filled loose steel tube
- strain relief and armour by helically laid steel wires
- PA outer jacket

Description:
- central loose steel tube
- high permissible tensile forces
- high crush resistance
- longitudinally and laterally watertight
- excellent rodent protection
- compact design, high flexibility
- excellent oil and hydrocarbon resistance
- resistance against ozone and weathering
- low weight
- halogen free
- installation with standard dead-ends and suspension fittings
- min. bending radius (D = cable Ø)
  under tensile load 20 x D
  without tensile load 15 x D

Temperature range:
- operating temperature - 40 °C ... + 70 °C
- storage temperature - 40 °C ... + 70 °C
- installation temperature - 5 °C ... + 50 °C

Jacket colour:
- blue, similar to RAL 5005

Applicable standards:
- IEC 60793-1 fibre characteristics
- IEC 60794-1-2-E11 bending properties
- IEC 60794-1-2-E1 tensile resistance
- IEC 60794-1-2-E3 crush resistance
- IEC 60794-1-2-F1 operating temperature
- IEC 60754-1 halogen content
- IEC 60754-2 corrosivity of fumes
- IEC 60811-2-1 oil resistance
- DIN EN 50396 ozone resistance
- ISO 4982-2 UV resistance (test method A)

Remarks:
- different types of fibres available
- pre-assembled cables with standard ferrule connectors or with connectors with
  IP protection class available upon request
- accessories, suspension fittings and repair kit available upon request

Technical data

Type	No. of fibres	Ø D mm	Weight kg/km
1F	1	3.4	18
2F	2	3.8	25
4F	4	3.8	25
8F	8	4.8	46

Type	Admissible tensile force max.		Crush resistance max. N/cm
	short term N	permanent N	
1F	800	600	2000
2F	1500	1100	960
4F	1300	900	800
8F	3500	2600	1000

BRUclean 250

Non-metallic fibre optic cable with central loose tube **A-DQ(ZN)B2Y**

Application:
- outdoors, direct laying in the ground

Construction:
- fibres with primary coating
- jelly filled loose tube
- glass rovings and water blocking tape
- PE outer jacket

Description:
- central loose tube with up to 24 fibres
- high permissible tensile forces
- high crush resistance
- longitudinally watertight
- good rodent protection
- compact design, high flexibility
- resistance against ozone and weathering
- low weight
- halogen free
- min. bending radius (D = cable Ø)
  under tensile load 20 x D
  without tensile load 15 x D

Temperature range:
- operating temperature - 40 °C ... + 60 °C
- storage temperature - 40 °C ... + 70 °C
- installation temperature - 5 °C ... + 50 °C

Jacket colour:
- black with orange stripe
  similar to RAL 9005 / 2003

Remarks:
- different types of fibres available
- accessories available upon request

Technical data

Type	No. of	Ø D	Weight	Admissible tensile force max.		crush resistance
1D25	12	9.6	90	3000	2500	300
1D30	24	9.9	100	3000	2500	300

BRUclean 150+W

Fibre optic cable with central loose tube and corrugated steel tape armour **A-DQ(ZN)B2YW2Y**

Application:
- outdoors, direct laying in the ground

Construction:
- fibres with primary coating
- jelly filled loose tube
- glass rovings and water blocking tape
- PE inner jacket
- corrugated steel tape armour
- PE outer jacket

Description:
- central loose tube with up to 24 fibres
- high permissible tensile forces
- high crush resistance
- longitudinally and laterally watertight
- excellent rodent protection
- compact design, high flexibility
- resistance against ozone and weathering
- low weight
- halogen free
- min. bending radius (D = cable Ø)
  under tensile load 20 x D
  without tensile load 15 x D

Temperature range:
- operating temperature - 40 °C ... + 60 °C

Jacket colour:
- black with orange stripe
  similar to RAL 9005 / 2003

Remarks:
- different types of fibres available
- accessories available upon request

Technical data

Type	No. of	Ø D	Weight	Admissible tensile force max.		crush resistance
1D25	12	13.2	180	2000	1500	300
1D30	24	13.2	185	2000	1500	300

Compression cable lugs Al/Cu

Compression cable lugs for the connection of aluminium cables to copper bars

Application:
For strain relieved connections of class 2 Al cables as per DIN 48201 part 1 and Al ropes as per DIN EN 50182, as well as for screwing aluminium connections to copper bars in humid areas.

Remarks:
Available upon request:
- other types up to 400 mm²
- compression joints Al/Cu with copper connecting bolt
- copper plated aluminium washers

Construction:
- tube of electrolytic aluminium
- lug of Cu as per EN 13600
- bright surface

Description:
- with markings for correct crimping
- precise tube ends for simple cable insertion
- no creepage distance that could trigger the oxidation process
- grease filled tube to inhibit oxidation after crimping

Applicable standards:
- DIN 46329 tube dimensions

Technical data

Cross section mm²	Bolt Ø	Part no.	d1 mm	b mm	d2 mm	l mm	Cu content kg/100 pcs.	Weight kg/100 pcs.	Packaging unit pcs.
95	M10	PAC095/10	13.2	30.0	10.5	90.5	7.4	11.4	10
95	M12	PAC095/12	13.2	30.0	13.0	90.5	6.8	10.8	10
95	M16	PAC095/16	13.2	30.0	17.0	90.5	6.4	10.4	10
120	M12	PAC120/12	14.7	30.0	13.0	92.0	6.8	11.4	5
120	M16	PAC120/16	14.7	30.0	17.0	92.0	6.4	10.8	5
150	M12	PAC150/12	16.3	30.0	13.0	104.0	6.8	13.1	5
150	M16	PAC150/16	16.3	30.0	17.0	104.0	6.4	12.7	5
150	M20	PAC150/20	16.3	35.0	21.0	107.5	10.1	16.4	5
185	M10	PAC185/10	18.3	30.0	10.5	105.0	10.3	18.6	5
185	M12	PAC185/12	18.3	30.0	13.0	105.0	10.1	18.4	5
185	M16	PAC185/16	18.3	30.0	17.0	105.0	9.3	17.6	5
185	M20	PAC185/20	18.3	35.0	21.0	107.5	10.1	18.4	5
240	M10	PAC240/10	21.0	35.0	10.5	118.5	12.1	22.5	5
240	M12	PAC240/12	21.0	35.0	13.0	118.5	11.8	22.2	5
240	M16	PAC240/16	21.0	35.0	17.0	118.5	11.0	21.4	5
240	M20	PAC240/20	21.0	35.0	21.0	118.5	10.1	20.5	5
300	M12	PAC300/12	23.3	40.0	13.0	123.5	17.7	33.7	1
300	M16	PAC300/16	23.3	40.0	17.0	123.5	16.9	32.9	1
300	M20	PAC300/20	23.3	40.0	21.0	123.5	16.0	32.0	1

d1 Ø Al tube
b Ø Cu lug
d2 inner Ø Cu lug
l length up to centre of Cu lug

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