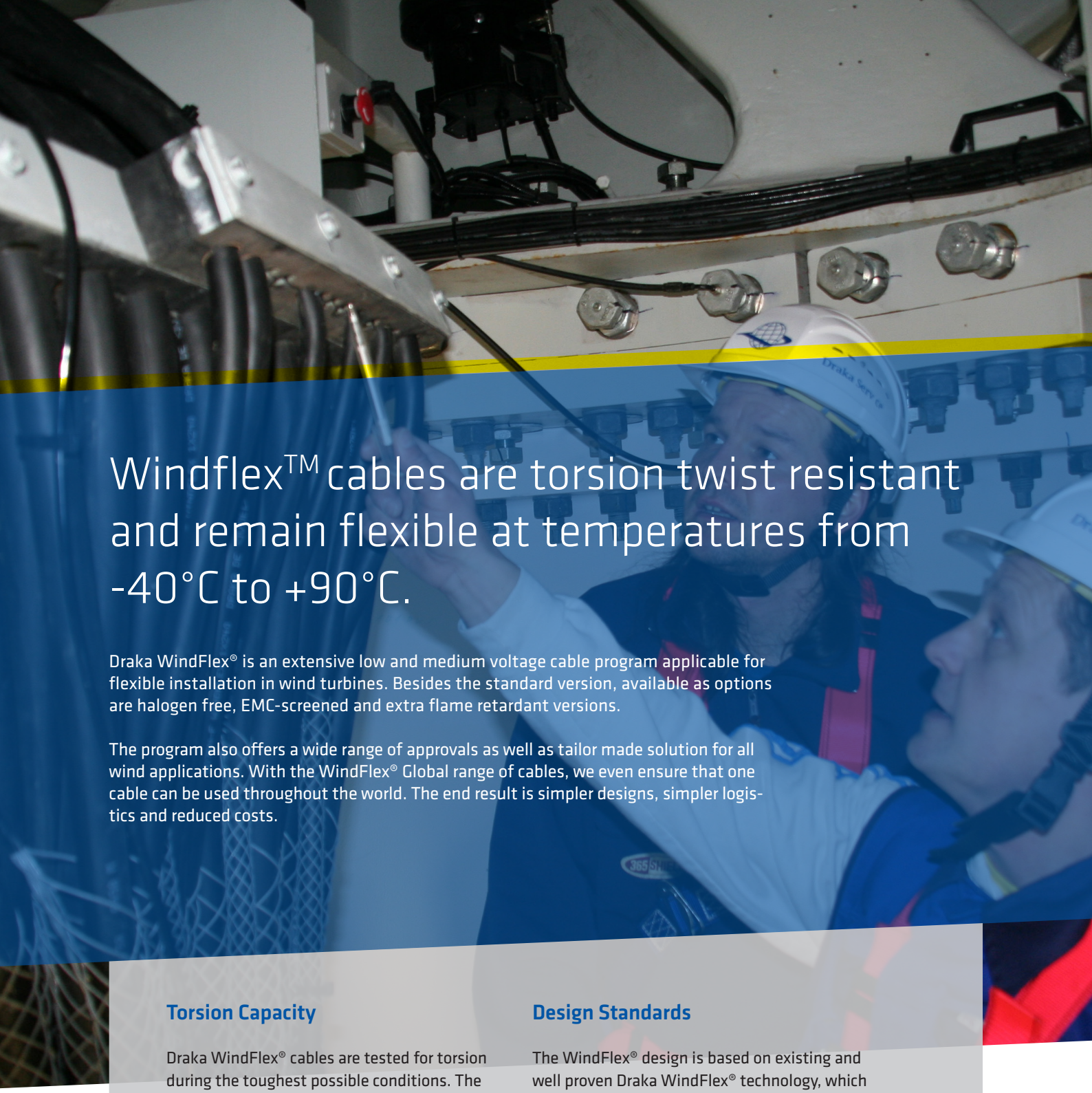
Draka

FOR INDUSTRY

WINDFLEX CABLES

Flexible, robuste and and environmentally resistant.



Windflex™ cables are torsion twist resistant and remain flexible at temperatures from -40°C to +90°C.

Draka WindFlex® is an extensive low and medium voltage cable program applicable for flexible installation in wind turbines. Besides the standard version, available as options are halogen free, EMC-screened and extra flame retardant versions.

The program also offers a wide range of approvals as well as tailor made solution for all wind applications. With the WindFlex® Global range of cables, we even ensure that one cable can be used throughout the world. The end result is simpler designs, simpler logistics and reduced costs.

Torsion Capacity

Draka WindFlex® cables are tested for torsion during the toughest possible conditions. The test is carried out at -40°C and the cables are twisted 4 x 360° each way over 10 meters for a minimum of 5000 complete cycles, to simulate 20 years lifetime.

Conductor Materials

Draka WindFlex® is designed for maximum flexibility and the conductors are always made of class 5 annealed copper.

Design Standards

The WindFlex® design is based on existing and well proven Draka WindFlex® technology, which offers an effective combination of both rubber insulation and sheathing. WindFlex® cables are robust due to the special high quality thermo-setting insulating and sheathing compounds used in their manufacture. They have a -40°C to +90°C temperature range as standard, however a special +120°C version is also available.

Windflex™ cable portfolio is designed for flexible application inside windturbine towers.

Prysmian Group is world leading in the development and production of innovative and robust cable solutions for industry application and a reliable partner for consultants and electrical installers. Industrial environments have unique requirements for cables, therefore our wide range of cable products is based on extensive know-how and experience from numerous industrial environments and processes.

You can count on our expertise and service to meet your requirements. We recommend the type of cable you need for your specific and demanding environment - with or without screen or in a halogen-free version. Our cables meet the highest demands for handling, fire classification and durability.

Oil & Chemical Resistance

Draka WindFlex® offers excellent resistance against mineral and synthetic gear oils, cooling fluids as well as hydraulic oils. We are committed to upholding this standard by constantly testing our cable range against new industry oils. By doing this we are confident that the cables we offer have passed the most extensive fluid resistance test program in the industry.

Standards & Approvals

The basis of Draka WindFlex® is standard HD 22, which specifies the construction, dimensions and test requirements. Various options for approvals are available, such as UL Recognition (UL 758) and UL Listing (UL 1277 & UL 44). Additional enhanced flame resistance according to IEC 60332-3-24 category C, is also available.

WINDFLEX™

A complete cable program for windturbine application

UL Standards and Testing

It's important to understand the difference between a Recognized cable UL 758 and a Listed TC cable UL 1277 or UL 44

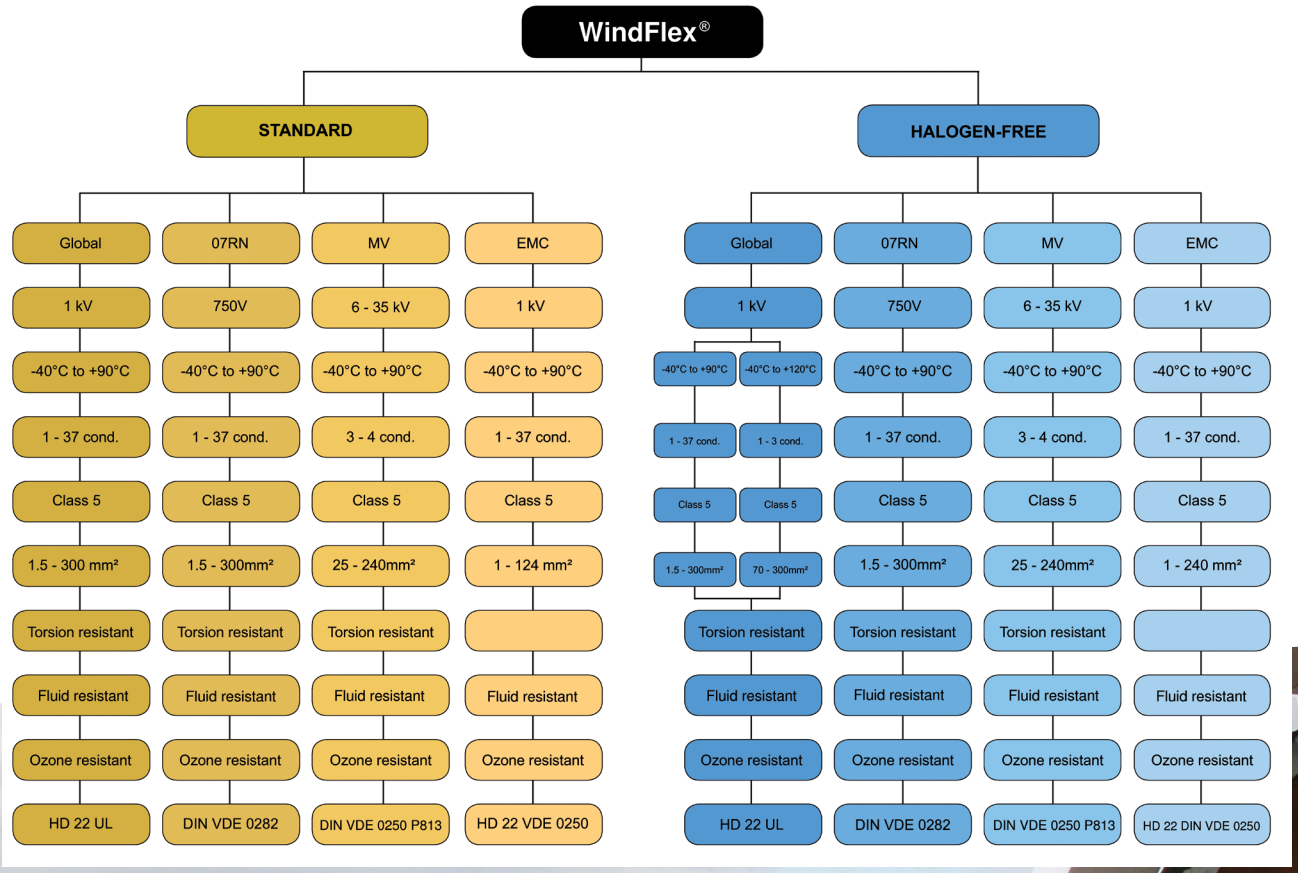
At Draka we listen to our customer's needs. For that reason we produce WindFlex® in different versions, depending on the wind turbine manufacturer's requirements for a UL Recognized vs Listed approval.

Draka provides the solution for wind turbine manufacturers to choose between UL Recognized or UL Listed. Just ask us, if you're in doubt!

Main points to consider when choosing which UL approval to use:

- Recognized cables can only be i nstalled in machines. Fixed and flexible mounting allowed.
- Listed TC cables are allowed for horizontal as well as vertical installation in buildings.
- Flammability requirements are much less severe for a recognized cable. Whereas, Listed TC cables are required to resist large scale flame tests.
- Recognized cables can be lighter, due to different design requirements, that allow the use of thinner insulation and jackets.
- As Listed TC cables are meant to be more "tough", thickness requirements are higher - so that the construction can withstand more severe flame tests.

Windflex familiy is comprised of 2 basic cable constructions each with 4 subordinate cables types.



Overview of Windflex™ cables

WindFlex® Global 0.6/1kV

Application

Flexible rubber cable for use in wind turbines at medium mechanical stress and in torsion applications.

Construction

- Approval according to cUL Style 4537, AWM UL 758 similar to DIN VDE 0250.
- Conductor insulation made of plain copper fine wire class 5 acc. IEC 60228.
- Insulation made of rubber compound type Class 28 UL, Type 3GI3 acc. to DIN VDE 0207 part 20.
- Inner sheath made of rubber compound type GM1b acc. to DIN VDE 0207 part 21.
- Outer sheath made of rubber compound type 5GM3 cUL Style 4537.
- Bending radius when moved minimum 6 x D and for fixed minimum 4 x D.
- Minimum surface temperature fixed and moved from -40˚C to maximum conductor temperature +90˚C.

WindFlex® Global 0.6/1kV LSOH

Application

Flexible halogen free rubber cable for use in wind turbines at medium mechanical stress and in torsion applications.

Construction

- Approval according to cUL Style 21465, AWM UL 758 similar to DIN VDE 0250 and DIN VDE 0282 Part 13 VDE Reg. No. 8143.
- Conductor made of plain copper, fine wire class 5 acc. IEC 60228.
- Insulation made of rubber compound type Class 28 UL, Type 3GI3 acc. to DIN VDE 0207 part 20.
- Inner Sheath made of rubber compound type GM1b acc. to DIN VDE 0207 part 21.
- Outer sheath made of rubber compound type HXM1 cUL Style 21465.
- Bending radius when moved minimum 6 x D and when fixed minimum 4 x D.
- Minimum surface temperature fixed and moved from -40˚C to maximum conductor temperatur +90˚C.

WindFlex® EMC 0.6/1kV LSOH

Application

Flexible halogen free rubber cable for use in wind turbines at medium mechanical stress without torsion.

Construction

- Conductor made of plain copper, fine wire class 5 acc. to IEC 60228.
- Insulation made of rubber compound type 3GI3 acc. to DIN VDE 0207 part 20.
- Inner sheath made of rubber compound type GM1b acc. to DIN VDE 0207 part 21, separator of PETP - film.
- Screen made of braid of tinned copper wires covering> 85%.
- Outer sheath made of rubber compound type HXM1 acc. to DIN VDE 0266.
- Bending radius when moved minimum 6 x D and when fixed minimum 4 x D.
- Minimum surface temperature fixed and moved from -40˚C to maximum conductor tempeture +90˚C.

WindFlex® MV Power 6 - 35kV

Application

Flexible medium voltage rubber cable for use in wind turbines at medium mechanical stress and in torsion applications. Standard or halogen free version.

Construction

- Conductor made of plain copper, fine wire class 5 acc. to IEC 60228.
- Insulation made of rubber compound type 3GI3 acc. to DIN VDE 0207 part 20 or HEPR super clean acc. to IEC 60502-2.
- Inner sheath made of rubber compound type GM1b acc. to DIN VDE 0207 part 21.
- Outher sheath made of rubber compound type 5GM3 acc. to DIN VDE 0207 part 21 or halogen free compound HXM1 acc. to DIN VDE 0266.
- Bending radius when moved minimum 10 x D and when fixed minimum 6 x D.
- Minimum surface temperature fixed and moved from -40˚C to maximum conductor temperature +90˚C.

Windflex™ cable specifications

WindFlex® Global 0.6/1kV

Cores x cross-section mm²	Cable diameter mm	Weight kg / km
1 x 120	22.5 - 25.5	1460
1 x 240	30.0 - 33.0	2760
3 x 70	39.5 - 43.5	3420
3 x 240	68.0 - 74.0	10600

Note additional cross-sections and number of cores are available on request.

Electrical data

Nominal voltage	0.6/1 kV
Conductor temperature	+90˚C
Maximum short circuit temp.	+250˚C
Design standard	HD 22, UL
Behavior on fire acc. to	IEC 60332-1-1/2
Oil resistance acc. to	IEC 60811-2-1
Ozone resistance acc. to	IEC 60811-2-1
UV resistant	Yes

WindFlex® Global 0.6/1kV LSOH

Cores x cross-section mm²	Cable diameter mm	Weight kg / km
1 x 120	22.5 - 25.5	1490
1 x 240	30.0 - 33.0	2800
3 x 70	39.5 - 43.5	3470
3 x 240	68.0 - 74.0	10700

Note additional cross-sections and number of cores are available on request.

Electrical data

Nominal voltage	0.6/1kV
Conductor temperature	+90˚C
Maximum short circuit temp.	+250˚C
Design standard	DIN 0250/0280 UL
Behavior on fire acc. to	IEC 60332-1-1/2
Smoke density acc. to	IEC 61034-2
Corrosive gases acc. to	IEC DIN EN 50267-2
Oil resistance acc. to	IEC 60811-2-1
Ozone resistance acc. to	IEC 60811-2-1
UV resistant	Yes

WindFlex® EMC 0.6/1kV LSOH

Cores x cross-section mm²	Cable diameter mm	Weight kg / km
3 x 70/35	41 - 46	3850
3 x 150/50	55 - 60	7200

Note additional cross-sections and number of cores are available on request.

Electrical data

Nominal voltage	0.6/1kV
Conductor temperature	+90˚C
Maximum short circuit temp.	+250˚C
Design standard	DIN 0250, HD 22,4
Behavior on fire acc. to	IEC 60332-1-1/2
Smoke density acc. to	IEC 61034-2
Corrosive gases acc. to	IEC DIN EN 50267-2
Oil resistance acc. to	IEC 60811-2-1
Ozone resistance acc. to	IEC 60811-2-1
UV resistant	Yes

WindFlex® MV Power 6 - 35kV

Cores x cross-section mm²	Cable diameter mm	Weight kg / km
3 x 25/25	59 - 65	5900
3 x 70/70	75 - 81	8950

Note additional cross-sections and number of cores are available on request.

Options for Windflex MV Power:
Available as a four core cable with three phase conductors and one earth conductor or as a three core cable with the earth conductor made as a spiral of copper wires outside each core, which gives a thinner and lighter cable. Also available with EPR core insulation type 3GI3 or with super clean HEPR insulation allowing for reduced insulation thickness and thus, a thinner and lighter cable.

Electrical data

Nominal voltage	3.6/6kV & 8.7/15kV 12/20kV & 20/35kV
Conductor temperature	+90˚C
Maximum short circuit temp.	+250˚C
Design standard	DIN VDE 0250 P813
Behavior on fire acc. to	IEC 60332-1-1/2
Oil resistance acc. to	IEC 60811-2-1
Ozone resistance acc. to	IEC 60811-2-1
UV resistant	Yes

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