# Stay cool!

## Our Arctic Crane cables never get cold feet.





Linking the Future

## Hangs tough

Top notch quality in all materials and details makes the mechanical performance unsurpassable even in the harshest of environments.

## **Cold** resistant

Thanks to superior materials our Arctic Crane cables continue to work flawlessly down to -50 °C.

## Excellent flexibility

Even though extremely resistant to both cold and mechanical impact the cables are surprisingly flexible and easy to work with.



## Our Arctic Crane cables never get cold feet.

With a specially developed inner and outer sheath material, our Artic Crane cables are fit to operate in a fully flexible operation mode down to –50 °C. And even more important: without any limitation in the travelling speed, bending radii or tensile force required by the new generation of ASC, RMG and E-RTG cranes. Rest assured, our cables will stand steadfast as the arctic winds cover everything in ice.

#### ARCTIC CRANE CABLES

As global warming is opening up the Northern Sea Route for major seaborne freight companies, the need for highspeed and automated stacking cranes at container terminals in the artic region will increase rapidly. To secure the quality of these cranes also under very harsh weather conditions, reliable components such as cables feeding the cranes with both electricity and digital information is paramount.

Our Arctic Crane cables combines superior mechanical performance with enhanced resistance to extremely low temperatures. The specially developed inner and outer sheath allows the cables to be utilised fully down to –50 °C, without any limitation in travelling speed, bending radius or tensile force. And, this is accomplished without any major changes in dimension, weight or other mechanical or electrical capacities.

#### MAIN FEATURES

- 🚫 Cold resistant to –50 °C
- Superior impact and abrasion resistance
- Excellent flexibility, also at very low temperature
- Resistant to oil, ozone, UV, moisture and water
- First-rate mechanical and electrical characteristics

## COMMITTED TO INNOVATION

## Made in Germany

We've been making cables in Germany for more than 160 years. During all this time we've done what Germans do best: provided customers and communities worldwide with products and solutions based on state-ofthe-art technology, consistent excellence in execution and in-depth understanding of the needs of an evolving market. It is not for nothing that German Art of Engineering is well-known throughout the world.

## Applications overview

Application groups	Description	Product name	Designation	Tensile load max.	Speed* max.	Temperature range	Mechanical stress max.
LV reeling	LOW VOLTAGE REELING CABLES	CORDAFLEX (SMK) –50°C	(N)SHTOEU	30 N/mm²	240 m/min	–50°C up to +80°C	Very high
Spreader	LOW VOLTAGE CABLES FOR VERTICAL REELING	CORDAFLEX (SMK)-V –50°C	(N)SHTOEU	30 N/mm²	240 m/min	–50°C up to +80°C	Very high
	LOW VOLTAGE CABLES FOR BASKET OPERATION	SPREADERFLEX -50°C	3GSLTOE / SYSLTOE	Increased	160 m/min	-50°C up to +80°C	Very high
Festoon	ROUND LOW VOLTAGE CABLES FOR FESTOON OPERATION	RONDOFLEX –50 °C	(N)GRDGOEU	15 N/mm²	240 m/min	-50°C up to +80°C	High
	FLAT LOW VOLTAGE CABLES FOR FESTOON OPERATION	PLANOFLEX –50 °C	NGFLGOEU	15 N/mm²	180 m/min	-50°C up to +80°C	Moderate
0000	CABLES FOR DATA TRANSMISSION	OPTOFLEX –50 °C	G62.5/125, G50/125, E9/125	500 N	120 m/min (Reeling), 240 m/min (Festoon)	-50°C up to +80°C	High
Chain	LOW VOLTAGE CABLES FOR CHAIN OPERATION	RONDOFLEX (CHAIN) –50°C	(N)GRDGOEU/(N) GRDGCGOEU	15 N/mm²	240 m/min	–50 °C up to +80 °C	High
MV reeling		PROTOLON (SMK) –50 °C	(N)TSCGEWOEU	30 N/mm²	240 m/min	-50°C up to +80°C	Very high
	MEDIUM VOLTAGE REELING CABLES	PROTOLON (SMK) LWL –50 °C	(N)TSKCGEWOEU	30 N/mm²	240 m/min	-50°C up to +80°C	Very high

\* For specific configuration (e.g. optical fibers and/or TSP) please consider speed adjustment factor for operation at temperatures below -40 °C. Consult the manufacturer for further information.

## CORDAFLEX(SMK) –50 °C 0.6/1 kV



Low voltage reeling cables for E-RTG's.

#### Application

Flexible low voltage reeling cable for power supply (also with integrated fiber optics), suitable for application under high and very high mechanical stresses. The main application is reeling operation on ERTG's (Electrified Rubber Tyred Gantry cranes).

CORDAFLEX(SMK) –50°C		
Global data		
Brand	CORDAFLEX (SMK) –50 °C	
Type designation	(N)SHTOEU-J	
Standard	Based on DIN VDE 0250-814.	
Certifications / Approvals	VDE Reg. Nr. 7519 EAC Certificate	
Design features		
Cross section range	Power: 3C+3G, 4C, 5C Control: from 7 up to 56, integra- tion with FO or TSP possible.	
Conductor	Electrolytic copper tinned, very finely stranded class FS.	
Insulation	Special compound based on high-quality EPR for extreme cold conditions down to –50 °C.	
Fiber covering	Loose tube with filling compound, Basic material: ETFE. Compound: 7YI 1, Natural color.	
Core arrangement	Laid-up in a maximum of 3 layers.	
Sheath system	Inner sheath and outer sheath made of special rubber compound type PCP (better than 5GM5) for extreme cold conditions down to -50 °C. With integrated reinforcement made of polyester braid for torsion protection.	
Floctrical parameters		
Electrical parameters		
Rated voltage U <sub>0</sub> /U (U <sub>max</sub> ) AC test voltage – main cores	0.6/1 kV (1.2 kV) 3.5 kV (5 min.)	
Data transmission	Special design with fibre-optics for trouble free data transmission at high data rates.	
Current carrying capacity	Acc. to DIN VDE 0298, Part 4.	

CORDAFLEX(SMK) –50 °C		
Chemical parameters		
Oil resistance	Acc. to DIN EN 60811-404.	
Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone, UV, moisture and cold temperatures.	
Thermal parameters		
Max. operating temperature of the conductor	90°C	
Max. short circuit temperature of the conductor	250°C	
Ambient temperature for fixed installation	min. –50°C, max. +80°C	
Ambient temperature in fully flexible operation	min. –50°C, max. +80°C	
Mechanical parameters		
Max. tensile load on the conductor	30 N/mm²	
Bending radii min.	Acc. to DIN VDE 0298 part 3.	
Min. distance with S-type directional changes	20 x D (D=cable diameter)	
Travel speed	Gantry (reeling operation): up to 240 m/min.	

### CORDAFLEX(SMK)-V –50 °C 0.6/1 kV



Low voltage cables for vertical reeling.

#### Application

Flexible low voltage reeling cable for application under extreme mechanical stresses, specially designed for vertical reeling operation (spreader reeling application).

FeaturesBrandCORDAFLEX(SMK)-V -50 °CType designation(N)SHTOEU-J/-0StandardBased on DIN VDE 0250-814.Certifications / ApprovalsEAC CertificateDesign featuresCross section rangeControl: multicores from 7 up to 56 (integration with F0 also possible).ConductorElectrolytic bare copper, very finely stranded class FS.InsulationSpecial compound based on high-quality ETFE for extreme cold conditions down to -50°C.Support elementCentral aramide support element to increase the loading capability.Sheath systemInner sheath and outer sheath made of special rubber compound type PCP (better than 5GMS)) for extreme cold conditions down to -50°C.Electrolytic aparemetersWith integrated reinforcement made of polyester braid for torsion protection.Electrolytic utage uo/U (U <sub>max</sub> )0.6/1 kV (1.2 kV)AC test voltage - main cores3.5 kV (5 min.)Data transmissionSpecial design with fibre-optics for trouble free data transmission at high data rates.Current carrying capacityAcc. to DIN VDE 0298, Part 4.	CORDAFLEX(SMK)-V –50°C				
Type designationControl any of the testType designation(N)SHTOEU-J/-0StandardBased on DIN VDE 0250-814.Certifications / ApprovalsEAC CertificateDesign featuresCross section rangeControl: multicores from 7 up to 56 (integration with F0 also possible).ConductorElectrolytic bare copper, very finely stranded class FS.InsulationSpecial compound based on high-quality ETFE for extreme cold conditions down to -50°C.Core arrangementLaid-up in a maximum of 3 layers.Support elementCentral aramide support element to increase the loading capability.Sheath systemInner sheath and outer sheath made of special rubber compound type PCP (better than 55MS) for extreme cold conditions down to -50°C.Flectrical parametersVith integrated reinforcement made of polyester braid for torsion protection.Rated voltage Ug/U (Umax)0.6/1 kV (1.2 kV)AC test voltage – main cores3.5 kV (5 min.)Data transmissionSpecial design with fibre-optics for trouble free data transmission at ingi data rates.	Features				
StandardBased on DIN VDE 0250-814.Certifications / ApprovalsEAC CertificateDesign featuresControl: multicores from 7 up to 56 (integration with F0 also possible).ConductorElectrolytic bare copper, very finely stranded class FS.InsulationSpecial compound based on high-quality ETFE for extreme cold conditions down to -50°C.Core arrangementLaid-up in a maximum of 3 layers.Support elementCentral aramide support element to increase the loading capability.Sheath systemInner sheath and outer sheath made of special rubber compound type PCP (better than 5GM5) for extreme cold conditions down to -50°C.Electrical parametersVith integrated reinforcement made of polyester braid for torsion protection.Rated voltage Ug/U (Umax)0.6/1 kV (1.2 kV)Ac test voltage – main coresSpecial design with fibre-optics for trouble free data transmission at igh data rates.	Brand	CORDAFLEX(SMK)-V -50 °C			
Certifications / ApprovalsEAC CertificateDesign featuresCross section rangeControl: multicores from 7 up to 56 (integration with F0 also possible).ConductorElectrolytic bare copper, very finely stranded class FS.InsulationSpecial compound based on high-quality ETFE for extreme cold conditions down to -50 °C.Core arrangementLaid-up in a maximum of 3 layers.Support elementCentral aramide support element to increase the loading capability.Sheath systemInner sheath and outer sheath made of special rubber compound type PCP (better than 5GMS) for extreme cold conditions down to -50 °C.Electrical parametersVith integrated reinforcement made of polyester braid for torsion protection.Rated voltage Ug/U (Umax)0.6/1 kV (1.2 kV)Ac test voltage – main coresSpecial design with fibre-optics for trouble free data transmission at ign data rates.	Type designation	(N)SHTOEU-J/-O			
Design featuresCross section rangeControl: multicores from 7 up to 56 (integration with F0 also possible).ConductorElectrolytic bare copper, very finely stranded class FS.InsulationSpecial compound based on high-quality ETFE for extreme cold conditions down to -50 °C.Core arrangementLaid-up in a maximum of 3 layers.Support elementCentral aramide support element to increase the loading capability.Sheath systemInner sheath and outer sheath made of special rubber compound type PCP (better than 56M5) for extreme cold conditions down to -50 °C.Electrical parametersWith integrated reinforcement made of polyester braid for torsion protection.Rated voltage U <sub>0</sub> /U (U <sub>max</sub> )0.6/1 kV (1.2 kV)Ac test voltage – main coresSpecial design with fibre-optics for trouble free data transmission at high data rates.	Standard	Based on DIN VDE 0250-814.			
Cross section rangeControl: multicores from 7 up to 56 (integration with F0 also possible).ConductorElectrolytic bare copper, very finely stranded class FS.InsulationSpecial compound based on high-quality ETFE for extreme cold conditions down to -50°C.Core arrangementLaid-up in a maximum of 3 layers.Support elementCentral aramide support element to increase the loading capability.Sheath systemInner sheath and outer sheath made of special rubber compound type PCP (better than 5GMS) for extreme cold conditions down to -50°C.Electrical parametersWith integrated reinforcement made of polyester braid for torsion protection.Rated voltage U <sub>0</sub> /U (U <sub>max</sub> )0.6/1 kV (1.2 kV)Ac test voltage – main coresSpecial design with fibre-optics for trouble free data transmission at ign data rates.	Certifications / Approvals	EAC Certificate			
Cross section range7 up to 56 (integration with F0 also possible).ConductorElectrolytic bare copper, very finely stranded class FS.InsulationSpecial compound based on high-quality ETFE for extreme cold conditions down to -50 °C.Core arrangementLaid-up in a maximum of 3 layers.Support elementCentral aramide support element to increase the loading capability.Sheath systemInner sheath and outer sheath made of special rubber compound type PCP (better than 5GM5) for extreme cold conditions down to -50 °C.Electrical parametersWith integrated reinforcement made of polyester braid for torsion protection.Rated voltage U_0/U (Umax)0.6/1 kV (1.2 kV)Ac test voltage – main coresSpecial design with fibre-optics for trouble free data transmission at ign data rates.	Design features				
Conductorvery finely stranded class FS.InsulationSpecial compound based on high-quality ETFE for extreme cold conditions down to -50°C.Core arrangementLaid-up in a maximum of 3 layers.Support elementCentral aramide support element to increase the loading capability.Sheath systemInner sheath and outer sheath made of special rubber compound type PCP (better than 5GMS) for extreme cold conditions down to -50°C.Electrical parametersWith integrated reinforcement made of polyester braid for torsion protection.Rated voltage U <sub>0</sub> /U (U <sub>max</sub> )0.6/1 kV (1.2 kV)Ac test voltage – main coresSpecial design with fibre-optics for trouble free data transmission at high data rates.	Cross section range	7 up to 56 (integration with			
Insulationhigh-quality ETFE for extreme cold conditions down to -50°C.Core arrangementLaid-up in a maximum of 3 layers.Support elementCentral aramide support element to increase the loading capability.Sheath systemInner sheath and outer sheath made of special rubber compound type PCP (better than 5GM5) for extreme cold conditions down to -50°C.Sheath systemWith integrated reinforcement made of polyester braid for torsion protection.Electrical parameters0.6/1 kV (1.2 kV)AC test voltage – main cores3.5 kV (5 min.)Data transmissionSpecial design with fibre-optics for trouble free data transmission at ign data rates.	Conductor				
Support element Central aramide support element to increase the loading capability.   Inner sheath and outer sheath made of special rubber compound type PCP (better than 5GM5) for extreme cold conditions down to -50°C.   Sheath system With integrated reinforcement made of polyester braid for torsion protection.   Electrical parameters 0.6/1 kV (1.2 kV)   AC test voltage – main cores 3.5 kV (5 min.)   Data transmission Special design with fibre-optics for trouble free data transmission at high data rates.	Insulation	high-quality ETFE for extreme			
Support element to increase the loading capability.   Inner sheath and outer sheath made of special rubber compound type PCP (better than 5GM5) for extreme cold conditions down to -50°C.   Sheath system With integrated reinforcement made of polyester braid for torsion protection.   Electrical parameters 0.6/1 kV (1.2 kV)   AC test voltage – main cores 3.5 kV (5 min.)   Data transmission Special design with fibre-optics for trouble free data transmission at high data rates.	Core arrangement	Laid-up in a maximum of 3 layers.			
Sheath systemmade of special rubber compound type PCP (better than 5GM5) for extreme cold conditions down to -50°C. With integrated reinforcement made of polyester braid for torsion protection.Electrical parameters0.6/1 kV (1.2 kV)Rated voltage U_0/U (Umax)0.6/1 kV (1.2 kV)AC test voltage – main cores3.5 kV (5 min.)Data transmissionSpecial design with fibre-optics for trouble free data transmission at high data rates.	Support element				
Rated voltage U <sub>0</sub> /U (U <sub>max</sub> ) 0.6/1 kV (1.2 kV)   AC test voltage – main cores 3.5 kV (5 min.)   Data transmission Special design with fibre-optics for trouble free data transmission at high data rates.	Sheath system	made of special rubber compound type PCP (better than 5GM5) for extreme cold conditions down to –50°C. With integrated reinforcement made of polyester braid for			
AC test voltage – main cores 3.5 kV (5 min.) Data transmission Special design with fibre-optics for trouble free data transmission at high data rates.	Electrical parameters				
Data transmission Special design with fibre-optics for trouble free data transmission at high data rates.	Rated voltage U <sub>0</sub> /U (U <sub>max</sub> )	0.6/1 kV (1.2 kV)			
Data transmission trouble free data transmission at high data rates.	AC test voltage – main cores	3.5 kV (5 min.)			
Current carrying capacity Acc. to DIN VDE 0298, Part 4.	Data transmission	trouble free data transmission at			
	Current carrying capacity	Acc. to DIN VDE 0298, Part 4.			

#### CORDAFLEX(SMK)-V -50°C Acc. to DIN EN 60811-404 Oil resistance Unrestricted use outdoors and Weather resistance indoors, resistant to ozone, UV, moisture and cold temperatures. Max. operating temperature 90°C of the conductor Max. short circuit temperature 250°C of the conductor Ambient temperature min. -50°C, max. +80°C for fixed installation Ambient temperature min. –50 °C, max. +80 °C in fully flexible operation Increased tensile load through Max. tensile load on the conductor addtional support elements. Acc. to DIN VDE 0298 part 3. Bending radii min. Min. distance with S-type 20 x D directional changes (D=cable diameter) Hoist (vertical reeling): Travel speed up to 240 m/min.

## SPREADERFLEX –50 °C 0.6/1 kV



#### Spreader cables for basket operation.

#### Application

Feeder cable for load-lifting equipment, e.g. spreader with high mechanical stress in gravity-fed collector basket operation, with voltage rate up to 0.6/1 kV. Suitable for operation in cold environment.

SPREADERFLEX –50 °C		
Global data		
Brand	SPREADERFLEX -50 °C	
Type designation	3GSLTOE / SYSLTOE (with FO)	
Standard	Based on DIN VDE 0250.	
Certifications / Approvals	EAC Certificate	
Design features		
Cross section range	Control: multicores from 7 up to 56 (integration with FO or TSP also possible).	
Conductor	Electrolytic bare copper, extremely fine stranded, class FS.	
Insulation	Special compound based on high-quality EPR for extreme cold conditions down to –50 °C.	
Core arrangement	Core assembly: cores laid-up into bundles;. Bundle assembly: bundles laid-up around the cen- tral support element.	
Support element	Aramide threads woven round lead ball cords, arranged centrally.	
Outer sheath	Special PUR compound suitable for extreme cold conditions down to –50 °C.	
Electrical parameters		
Rated voltage $U_0/U$ ( $U_{max}$ )	0.6/1 kV (1.2 kV)	
AC test voltage – main cores	3.5 kV (5 min.)	
Data transmission	Special design with fibre-optics for trouble free data transmission at high data rates.	
Current carrying capacity	Acc. to DIN VDE 0298, Part 4.	

SPREADERFLEX –50 °C			
Chemical parameters			
Oil resistance	Acc. to DIN EN 60811-404		
Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone, UV, moisture and cold temperatures.		
Thermal parameters			
Max. operating temperature of the conductor	90°C		
Max. short circuit temperature of the conductor	250°C		
Ambient temperature for fixed installation	min. –50°C, max. +80°C		
Ambient temperature in fully flexible operation	min. –50°C, max. +80°C		
Mechanical parameters			
Max. tensile load on the conductor	Increased tensile load through addtional support element.		
Bending radii min.	Acc. to DIN VDE 0298 part 3.		
Travel speed	Hoist: up to 160 m/min.		

### RONDOFLEX –50 °C 0.6/1 kV



#### Low voltage round cables for festoon application.

#### Application

Flexible low voltage power and control cable, for use on festoon systems and for connecting movable parts of machine tools, material handling equipment, etc. Suitable for application under high mechanical stresses and frequent bending during operation.

RONDOFLEX -50 °C		
Global data		
Brand	RONDOFLEX -50 °C	
Type designation	(N)GRDGOEU / (N)GRDGCGOEU	
Standard	Based on DIN VDE 0250-814.	
Certifications / Approvals	EAC Certificate	
Design features		
Cross section range	Power: 1C, 3C+3G, 4C, 5C Control: multicores (also with BUS of TSP).	
Conductor	Bare electrolytic copper, finely stranded, class 5.	
Insulation	Special compound based on high-quality EPR for extreme cold conditions down to –50 °C.	
Core arrangement	Laid-up in a maximum of 3 layers.	
Inner sheath	Basic material EPR, rubber compound GM1b.	
Screen (where applicable)	Braid screen made of tinned copper wires (coverage >80%).	
Outer sheath	High grade special compound (at least 5GM3), based on PCP.	
Electrical parameters		
Rated voltage $U_0/U$ ( $U_{max}$ )	0.6/1 kV (1.2 kV)	
AC test voltage – main cores	3.5 kV (5 min.)	
Current carrying capacity	Acc. to DIN VDE 0298, Part 4.	

RONDOFLEX –50 °C			
Chemical parameters			
Oil resistance	Acc. to DIN EN 60811-404.		
Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone, UV, moisture and cold temperatures.		
Thermal parameters			
Max. operating temperature of the conductor	90°C		
Max. short circuit temperature of the conductor	250°C		
Ambient temperature for fixed installation	min. –50 °C, max. +80 °C		
Ambient temperature in fully flexible operation	min. –50 °C, max. +80 °C		
Mechanical parameters			
Max. tensile load on the conductor	15 N/mm²		
Bending radii min.	Acc. to DIN VDE 0298 part 3.		
Min. distance with S-type directional changes	20 x D (D=cable diameter)		
Travel speed	Trolley (festoon system): up to 240 m/min. Reeling operation: 60 m/min.		

## PLANOFLEX -50 °C 300/500 V



Low voltage flat cables for festoon application.

#### Application

Flexible low voltage power and control cable, for use on festoon systems and for connecting moveable parts of machine tools, material handling equipment, etc., associated with high mechanical stresses and frequent bending during operation and for bending in one plane only.

PLANOFLEX –50°C		
Global data		
Brand	PLANOFLEX –50 °C	
Type designation	NGFLGOEU-J/-0	
Standard	DIN VDE 0250-809.	
Certifications / Approvals	VDE Marking UL-File E 113313 EAC Certificate	
Design features		
Cross section range	Power: 4C, 5C, 7C Control: multicore (also with IS and TSP).	
Conductor	Electrolytic copper, not tinned: Up to 25 mm <sup>2</sup> : extremely finely stranded, class 6. Above 35 mm <sup>2</sup> : finely stranded, class 5.	
Insulation	Special compound based on high-quality EPR for extreme cold conditions down to –50 °C.	
Core arrangement	Parallel, for more than 12 cores: parallel bundles.	
Outer sheath	Basic material CR, rubber compound 5GM3 (refer also to DIN VDE 0207, Part 21).	
Electrical parameters		
Rated voltage $U_0/U$ ( $U_{max}$ )	0.6/1 kV (1.2 kV)	
AC test voltage – main cores	2.5 kV (5 min.)	
Current carrying capacity	Acc. to DIN VDE 0298, Part 4.	

PLANOFLEX –50 °C			
Chemical parameters			
Oil resistance	Acc. to DIN EN 60811-404.		
Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone, UV, moisture and cold temperatures.		
Thermal parameters			
Max. operating temperature of the conductor	90°C		
Max. short circuit temperature of the conductor	250°C		
Ambient temperature for fixed installation	min. –50°C, max. +80°C		
Ambient temperature in fully flexible operation	min. –50°C, max. +80°C		
Mechanical parameters			
Max. tensile load on the conductor	15 N/mm²		
Bending radii min.	Acc. to DIN VDE 0298 part 3.		
Travel speed	Gantry (reeling operation): no application. On non-motorized festoon (trolley) system: guidance value up to 160 m/min. On motor-driven festoon (trolley) system: guidance value up to 180 m/min.		

## OPTOFLEX -50 °C G62.5/125, G50/125, E9/125



Rubber cables with fiber optic.

#### Application

Flexible fibre optic cable for signal and data transmission on cranes and material handling equipment; suitable for cable handling systems, such as reels, festoon systems, cable tenders, etc. at high data rates, large bandwidth and absolute immunity to electromagnetic interference.

OPTOFLEX -50°C		
Global data		
Brand	OPTOFLEX –50 °C	
Type designation	G62.5/125, G50/125, E9/125	
Standard	Based on FDDI, ISO/IEC 9314 Part 3, DIN VDE 0888.	
Design features		
Fiber types	G62,5/125 μ, G50/125 μ, E9/125 μ, 6, 12, 18, 24 elements.	
Fiber covering	Loose tube with filling compound, Basic material: ETFE, Compound: 7YI 1, Natural color.	
Core arrangement	Six cores, especially laid-up in one layer around a GFK supporting element (GFK=glass-fibre rein- forced plastic).	
Outer sheath	Basic material PCP, rubber compound 5GM3.	
Chemical parameters		
Oil resistance	Acc. to DIN EN 60811-404.	
Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone, UV, moisture and cold temperatures.	

OPTOFLEX -50°C		
Thermal parameters		
Ambient temperature for fixed installation	min. –50°C, max. +80°C	
Ambient temperature in fully flexible operation	min. –50°C, max. +80°C	
Mechanical parameters		
Permissible tensile force max.	500 N	
Bending radii min.	Fixed installation and on festoon system: 125 mm For reeling: 250 mm	
Min. distance with S-type directional changes	20 x D (D=cable diameter)	
	Gantry (reeling operation): up to 120 m/min (no random wound reel, cylindrical reel).	
Travel speed	Trolley (festoon systems): up to 240 m/min (festoon, cable tender). Hoist: no application.	

OPTOFLEX -50°C				
	Fiber type			
Optical fiber properties	Multi-mode graded index		Single-mode step index	
	G62.5/125 µm	G50/125 μm	E9/125 µm	
Core diameter (µm)	62.5	50	9	
Cladding diameter (µm)	125	125	125	
Fiber diameter (µm)	250	250	250	
Attenuation at 850 nm / 1310 nm / 1550 nm (dB/km)	< 3.3 / < 0.9 / -	< 2.8 / < 0.8 / -	- / < 0.4 / < 0.3	
Bandwidth at 850 nm / 1310 nm (MHz)	> 400 / > 600	> 400 / > 1200	-	
Numerical Aperture	0.275 ± 0.02	0.2 ± 0.02	0.14 ± 0.02	
Chromatic Dispersion at 1300 nm / 1550 nm (ps/nm km)	-	_	< 3.5 / < 18	

#### PRYSMIAN GROUP | CRANE CABLES

## RONDOFLEX(CHAIN) –50 °C 0.6/1 kV



#### Low voltage cables for energy chains.

#### Application

Applicable in all chain systems (e.g. container cranes, stacking cranes, indoor cranes, material handling equipment). Especially suitable in applications where, due to the outdoor installation, long travel distances or high travel speed, high performances are expected from the cable (such as long lifetime, full reliability, resistance to abrasion, etc.).

RONDOFLEX(CHAIN) –50°C		
Global data		
Brand	RONDOFLEX(CHAIN) –50°C	
Type designation	(N)GRDGOEU / (N)GRDGCGOEU	
Standard	Based on DIN VDE 0250-814.	
Certifications / Approvals	EAC Certificate	
Design features		
Cross section range	Power: 1C, 3C+3G, 4C, 5C Control: multicore (also with BUS, IS or TSP).	
Conductor	Bare electrolytic copper conductor, finely stranded, class 5. Earth conductor made of bare electrolytic copper, extremely finely stranded, class FS (better than class 5).	
Insulation	Special compound based on high-quality EPR for extreme cold conditions down to –50 °C.	
Core arrangement	Up to 10 mm <sup>2</sup> : 4-core design. From 16 mm <sup>2</sup> : 3-energy cores and splitted earth conductor into three parts.	
Inner sheath	Special compound based on EPR (at least GM1b).	
Screen (where applicable)	Braid screen made of tinned copper wires (coverage >80%).	
Outer sheath	High grade compound based on EVA with excellent abrasion and aging performances.	

RONDOFLEX(CHAIN) –50°C			
Electrical parameters			
Rated voltage U <sub>0</sub> /U (U <sub>max</sub> )	0.6/1 kV (1.2 kV)		
AC test voltage – main cores	3.5 kV (5 min.)		
Current carrying capacity	Acc. to DIN VDE 0298, Part 4.		
Chemical parameters			
Oil resistance	Acc. to DIN EN 60811-404.		
Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone, UV, moisture and cold temperatures.		
Thermal parameters			
Max. operating temperature of the conductor	90 °C		
Max. short circuit temperature of the conductor	250 °C		
Ambient temperature for fixed installation	min. –50 °C, max. +80 °C		
Ambient temperature in fully flexible operation	min. –50 °C, max. +80 °C		
Mechanical parameters			
Max. tensile load on the conductor	15 N/mm²		
Bending radii min.	Acc. to DIN VDE 0298 part 3.		
Travel speed	In chain systems: up to 240 m/min (Note: trouble free operation is influenced by several factors, among all the chain length. For long chain system we recom- mend to operate at lower speed).		

### PROTOLON(SMK) –50 °C 3.6/6 kV, 6/10 kV, 8.7/15 kV, 12/20 kV



#### Medium voltage reeling cable.

#### Application

Flexible medium voltage reeling cable for application under high to extreme mechanical stresses, e.g. high travel speeds, dynamic tensile loads, multiple changes of direction into different planes, churning on running over rollers and torsional stresses. Mainly for mobile equipment, e.g. fast-moving container cranes and large moving equipment.

PROTOLON(SMK) –50°C			
Global data			
Brand	PROTOLON(SMK) –50 °C		
Type designation	(N)TSCGEWOEU		
Standard	Based on DIN VDE 0250-813.		
Certifications / Approvals	GOST-R/-K/-B, Fire Certificate of Russia Federation		
Design features			
Cross section range	3C+3G (also + control or BUS)		
Conductor	Conductor and earth conductor made of electrolytic copper tinned, very finely stranded, class FS (refer also to DIN VDE 0295).		
Insulation	Special compound based on high-quality EPR for extreme cold conditions down to –50°C.		
Electrical field control	Inner and outer semi-conductive layer		
Core arrangement	Three-core design, with earth conductor split into 3 parts positioned in the interstices.		
Sheath system	Inner sheath and outer sheath made of special rubber compound type PCP (better than 5GM5) for extreme cold conditions down to -50 °C. With integrated reinforcement made of polyester braid for torsion protection.		

PROTOLON(SMK) –50°C					
Electrical parameters					
Rated voltage U <sub>0</sub> /U (kV)	3.6/6	6/10	8.7/15	12/20	
Max. permissible operating voltage AC (kV)	4.2/7.2	6.9/12	10.4/18	13.9/24	
AC test voltage (kV)	11	17	24	29	
Data transmission	Special design with fibre-optics for trouble free data transmission at high data rates.				
Current carrying capacity	Acc. to	Acc. to DIN VDE 0298, Part 4.			
Chemical parameters					
Oil resistance	Acc. to DIN EN 60811-404.				
Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone, UV, moisture and cold temperatures.				
Thermal parameters					
Max. operating temperature of the conductor	90°C				
Max. short circuit temperature of the conductor	250°C				
Ambient temperature for fixed installation	min. –50°C, max. +80°C				
Ambient temperature in fully flexible operation	min. –50°C, max. +80°C				
Mechanical parameters					
Max. tensile load on the conductor	20 N/mm²				
Bending radii min.	Acc. to DIN VDE 0298 part 3.			3.	
Min. distance with S-type directional changes	20 x D (D = cable diameter)				
Travel speed	Gantry (reeling operation): up to 240 m/min.				

## PROTOLON(SMK)-LWL –50 °C 3.6/6 kV, 6/10 kV, 8.7/15 kV, 12/20 kV



Medium voltage reeling cable with fibre-optics.

#### Application

Flexible medium voltage reeling cable with integrated fibre-optics for the combined transmission of energy and data, for application under high or extreme mechanical stresses, e.g. high travel speeds, dynamic tensile loads, multiple changes of direction into different planes,

PROTOLON(SMK)-LWL –50 °C			
Global data			
Brand	PROTOLON(SMK)-LWL –50 °C		
Type designation	(N)TSKCGEWOEU		
Standard	Based on DIN VDE 0250-813.		
Certifications / Approvals	GOST-R		
Design features			
Cross section range	3C+2G+FO (also + control or BUS)		
Conductor	Conductor and earth conductor made of electrolytic copper tinned, very finely stranded, class FS (refer also to DIN VDE 0295).		
Insulation	Special compound based on high-quality EPR for extreme cold conditions down to –50 °C.		
Electrical field control	Inner and outer semi-conductive layer		
Fiber covering	Loose tube with filling compound, Basic material: ETFE. Compound: 7YI 1, Natural color.		
Core arrangement	Three core design with cradle separator in the centre, earth conductor splitted into 2 parts positioned in two interstices.		
Sheath system	Inner sheath and outer sheath made of special rubber compound type PCP (better than 5GM5) for extreme cold conditions down to -50 °C. With integrated reinforcement made of polyester braid for torsion protection.		

churning on running over rollers and torsional stresses. Mainly for mobile equipment, e.g. fast-moving container cranes and large moving equipment.

PROTOLON(SMK)-LWL –50 °C				
Electrical parameters				
Rated voltage U <sub>0</sub> /U (kV)	3.6/6	6/10	8.7/15	12/20
Max. permissible operating voltage AC (kV)	4.2/7.2	6.9/12	10.4/18	13.9/24
AC test voltage (kV)	11	17	24	29
Data transmission	Special design with fibre-optics for trouble free data transmission at high data rates.			
Current carrying capacity	Acc. to	DIN VDE (	0298, Par	t 4.
Chemical parameters				
Oil resistance	Acc. to DIN EN 60811-404.			
Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone, UV, moisture and cold temperatures.			
Max. operating temperature of the conductor	90 °C			
Max. short circuit temperature of the conductor	250°C			
Ambient temperature for fixed installation	min. –50°C, max. +80°C			
Ambient temperature in fully flexible operation	min. –50°C, max. +80°C			
Mechanical parameters				
Max. tensile load on the conductor	20 N/mm²			
Bending radii min.	Acc. to DIN VDE 0298 part 3.			3.
Travel speed	Gantry (reeling operation): up to 240 m/min.			

## Fast and Forceful!

Prysmian Arctic Crane cables keep moving cargo even at -50 °C.

When it's painfully cold outside and everything freezes, Prysmian Arctic Crane cables keep the cranes in operation mode. The cables can handle temperatures as low as -50 °C up to +80 °C. As if that wasn't enough, these extremely durable cables can be winded at a speed of 240 meter per minute. When the going gets tough, Prysmian Arctic Crane cables just keep on going.

#### MAIN FEATURES

- Exceptional cold resistance: down to -50 °C
- Excellent impact and abrasion resistance
- Outstanding flexibility, also at very low temperatures
- Resistant to oil, ozone, UV, moisture and water
- Improved mechanical and electrical characteristics
- Travel speed: up to 240 meters per minute





## Linking the Future

#### **PRYSMIAN GROUP**

Prysmian Kabel und Systeme GmbH Phone: +49 (0) 30 3675 40

kontakt@prysmiangroup.com

© All rights reserved by Prysmian Group 2021-03 | Version 1.

Technical data, dimensions and weights are subject to change. All sizes and values without tolerances are reference values. Specifications are for product as supplied by Prysmian Group: any modification or alteration afterwards of product may give different result. The information contained within this document must not be copied, reprinted or reproduced in any form, either wholly or in part, without the written consent of Prysmian Group. The information is believed to be correct at the time of issue. Prysmian Group reserves the right to amend this specification without prior notice. This specification is not contractually valid unless specifically authorised by Prysmian Group.



prysmiangroup.de

in († 🌱 🗗 🞯

Follow us