Prysmian Group

Industry Cables

Special cables for industrial applications
General Catalogue

PRYSMIAN

Draka

Industry Cables

Special cables for industrial applications
General catalogue

Prysmian Group

Linking the Future

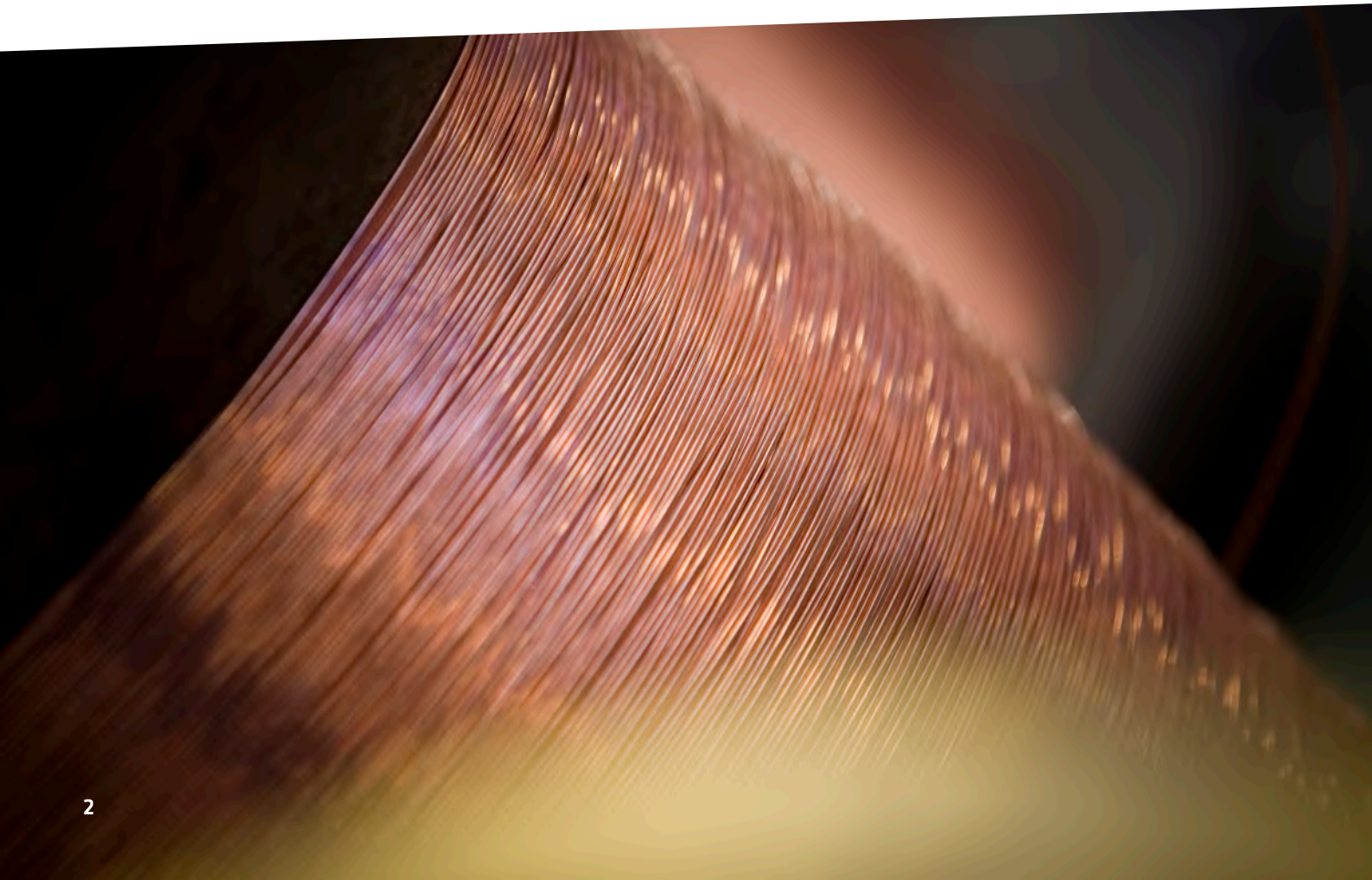
As the worldwide leader in the cable industry, Prysmian Group believes in the effective, efficient and sustainable supply of energy and information as a primary driver in the development of communities.

With this in mind, we provide major global organisations in many industries with best-in-class cable solutions, based on state-of-the-art technology. Through two renowned commercial brands - Prysmian and Draka - based in almost 50 countries, we're constantly close to our customers, enabling them to further develop the world's energy and telecoms infrastructures, and achieve sustainable, profitable growth.

In our energy business, we design, produce, distribute and install cables and systems for the transmission and distribution of power at low, medium, high and extra-high voltage.

In telecoms, the Group is a leading manufacturer of all types of copper and fibre cables, systems and accessories - covering voice, video and data transmission.

Drawing on over 130 years' experience and continuously investing in R&D, we apply excellence, understanding and integrity to everything we do, meeting and exceeding the precise needs of our customers across all continents, at the same time shaping the evolution of our industry.



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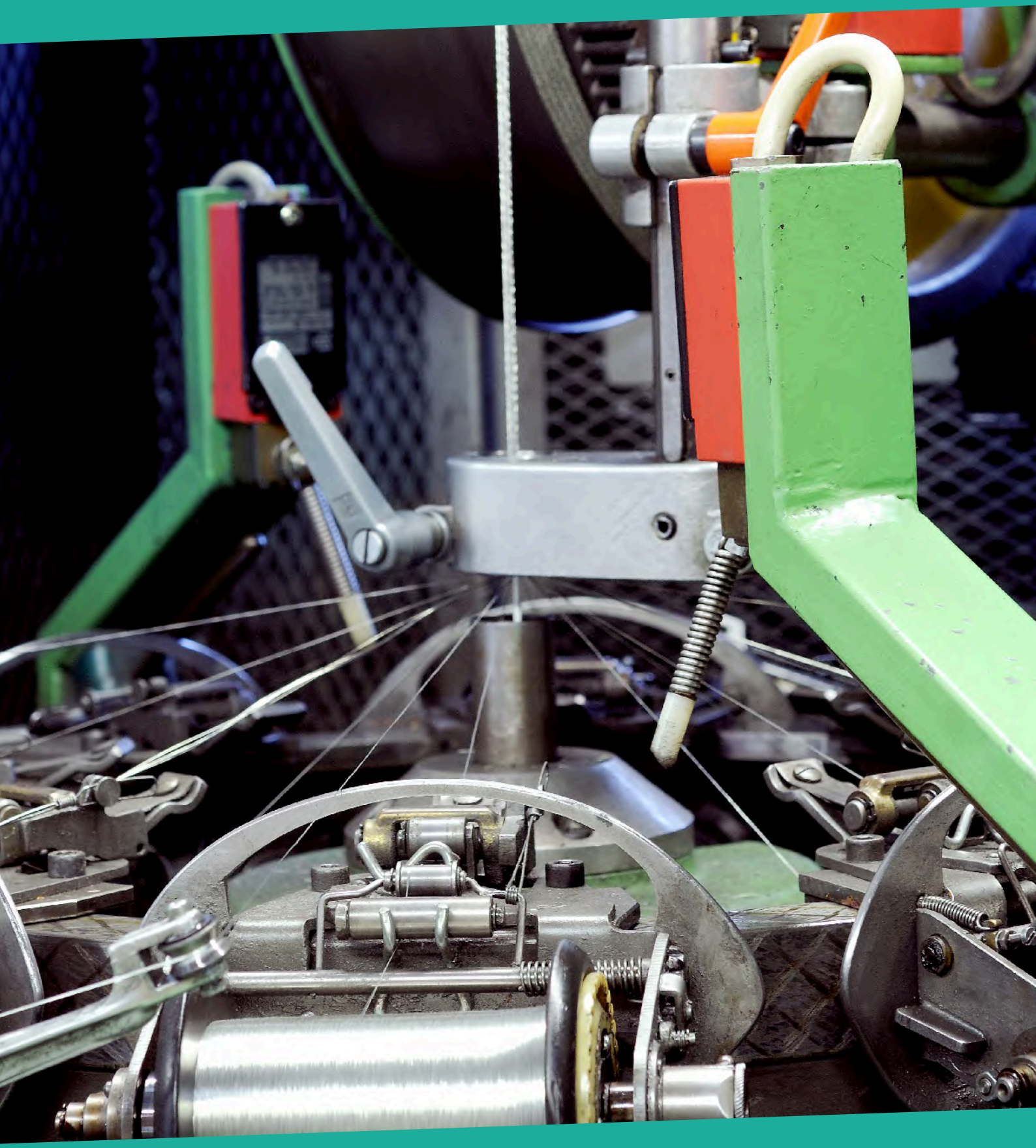


LOW VOLTAGE - RUBBER SHEATHED CABLES

Designation	Standard	Fire performance	Resistance to oil	Temp. fully flex. operation min.	Rated voltage
OZOFLEX H05RR-F	DIN EN 50525-2-21	DIN EN 60332-1-2	DIN EN 60811-404	-25°C	300/500 V
OZOFLEX H05RN-F	DIN EN 50525-2-21	DIN EN 60332-1-2	DIN EN 60811-404	-25°C	300/500 V
OZOFLEX H07RN-F	DIN EN 50525-2-21	DIN EN 60332-1-2	DIN EN 60811-404	-25°C	450/750 V

H05RR-F
OZOFLEX

Application
Rubber flexible cable are suitable for transportable equipment of office and home application, etc. less mechanical stress, for connecting electrical tools and lamps also on construction sites.
The cables are not suitable for permanent immersion in water
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	OZOFLEX
Type designation	H05RR-F
Standard	EN 50525-2-21

Design features

Conductor	Copper, finely stranded (F), class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Vulcanized rubber compound, basis EPR, compound EI4 in accordance with EN 50363-1
Color code	colored in accordance with DIN EN 50525-1
Outer sheath	Vulcanized rubber compound, basis CPE, compound EM3 in accordance with EN 50363-2-1
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	300/500V
Max. permissible operating voltage AC	0.318/0.55 kV
Max. permissible operating voltage DC	0.413/0.825 kV
AC test voltage	2 kV

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404

Thermal parameters

Max. permissible temperature at conductor	60 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-25 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
2 x 0.75	20003361	5DG12205	6	7.4	22	20	60	22.5	6	0.12
2 x 1	20003363	5DG12305	6.1	8	24	21	75	30	10	0.16
2 x 1.5	20003369	5DG12405	7.6	9.8	29	35	115	45	16	0.24
2 x 2.5	20006163	5DG12505	9	11.6	35	41	160	75	25	0.4
2 x 4		5DG12605	10.6	13.7	55	61	213	120	32	0.64
3G 0.75	20003371	5DG13205	6.2	8.1	24	29	75	33.75	6	0.12
3G 1	20003373	5DG13305	6.5	8.5	26	30	85	45	10	0.16
3G 1.5	20003375	5DG13405	8	10.4	31	37	135	67.5	16	0.24
3G 2.5	20003378	5DG13505	9.6	12.4	50	55	190	112.5	25	0.4
3G 4		5DG13605	11.3	14.5	58	65	262	180	32	0.64
3G 6		5DG13705	12.8	16.3	65	73	344	270	40	0.95
4G 0.75	20003380	5DG14205	6.8	8.8	26	31	90	45	6	0.12
4G 1	20003382	5DG14305	7.1	9.3	28	33	105	60	10	0.16
4G 1.5	20003384	5DG14405	9	11.6	35	41	165	90	16	0.24
4G 2.5		5DG14505	10.7	13.8	55	62	235	150	20	0.4
4G 4		5DG14605	12.7	16.2	65	73	329	240	25	0.64
4G 6		5DG14705	14.2	18.1	72	81	440	360	32	0.95
5G 0.75		5DG15205	7.6	9.9	30	35	132	56.25	6	0.12
5G 1		5DG15305	8	10.3	31	37	157	75	10	0.16
5G 1.5	20003386	5DG15405	9.8	12.7	51	57	190	112.5	16	0.24
5G 2.5	20003388	5DG15505	11.9	15.3	61	68	285	187.5	20	0.4
5G 4	20003388	5DG15605	14.6	18.6	74	83	407	300	25	0.64

(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, on surface acc. to VDE 0298-4
X = without gn/ye core, G = with gn/ye core

H05RN-F
OZOFLEX

Application
Rubber flexible cable are suitable for transportable equipment of office and home application, etc.: medium mechanical stresses, for connecting electrical tools and lamps also on construction sites.
The cables are not suitable for permanent immersion in water
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	OZOFLEX
Type designation	H05RN-F
Standard	EN 50525-2-21

Design features

Conductor Material	Bare copper
Conductor	Copper, finely stranded (F), class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Vulcanized rubber compound, basis EPR, compound EI4 in accordance with EN 50363-1
Color code	colored in accordance with DIN EN 50525-1
Outer sheath	synthetic rubber compound, compound EM2 in accordance with EN 50363-2-1
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	300/500V
Max. permissible operating voltage AC	0.318/0.55 kV
Max. permissible operating voltage DC	0.413/0.825 kV
AC test voltage	2 kV

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404
Ozone resistance	DIN EN 50396

Thermal parameters

Max. permissible temperature at conductor	60 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-25 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
2 x 0.75	20003391	5DG22205[	5.7	7.4	30	37	65	22.5	6	0.12
2 x 1	20003393	5DG22305[	6.1	8	32	40	75	30	10	0.16
3 G 0.75	20003400	5DG23205[	6.2	8.1	32	41	80	33.8	6	0.12
3 G 1	20003403	5DG23305[	6.5	8.5	34	43	90	45	10	0.16
4 x 0.75		5DG24205[	6.8	8.8	35	44	90	45	6	0.12
4 x 1	20023908	5DG24355[	7.1	9.3	37	47	90	60	10	0.16
4 G 1	20008911	5DG24305[	7.1	9.3	37	47	90	60	10	0.16

X = without gn/ye core, G = with gn/ye core
(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, on surface acc. to VDE 0298-4

H07RN-F
OZOFLEX

Application
Rubber flexible cable are suitable for: Use in dry, humid or moist rooms and outdoors: transportable motors or machines on building sites or in agricultural workings, etc.: medium mechanical stresses, e.g. for industrial and agricultural workshop appliances, large boiling installations, heating plates, inspection lamps, electric tools such as drills, circular saws, domestic electric tools: Use in workshops having an explosive atmosphere. When a cable is to be used in the presence of explosive or flammable atmospheres, guidance should be sought by reference to EN 60079 series of specifications and guidance should be sought in selecting suitable cables. Fixed installations e.g. on rough-cast in temporary buildings and huts for accommodation purposes: Wiring of constructional components in lifting appliances, machinery, etc.
Use up to 1000 V a.c. is permitted for fixed, protected installation (in conduit or appliances) and also for motor connections of hoisting motors and the like. The cables are not suitable for: Situations involving permanent immersion in water.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	OZOFLEX
Type designation	H07RN-F
Standard	EN 50525-2-21

Design features

Conductor Material	Bare copper
Conductor	bare copper, finely stranded (F), class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Vulcanized rubber compound, basis EPR, compound EI4 in accordance with EN 50363-2-1
Color code	in accordance with DIN EN 50525-1
Inner sheath	for multicore cables with wall thickness of sheath > 2,4mm and control cables: Vulcanized rubber compound, basis EPR, compound EM2/EM3 in accordance with EN 50363-1 Colour of sheath: light
Outer sheath	Vulcanized rubber compound, basis CPE, compound EM2 in accordance with EN 50363-1
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	450/750V
Max. permissible operating voltage AC	0.476/0.825 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC test voltage	2.5 kV

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404
Ozone resistance	DIN EN 50396

Thermal parameters

Max. permissible temperature at conductor	60 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
1 x 1,5	20006329	5DH21045	5.8	6.5	20	20	49	22.5	16	0.24
1 x 2,5	20003787	5DH21055	6.4	7.1	21	21	64	37.5	21	0.4
1 x 4	20003788	5DH21065	7.3	8	24	24	89	60	29	0.64
1 x 6	20003790	5DH21075	8	8.7	26	35	114	90	36	0.95
1 x 10	20003792	5DH21105	9.5	10.5	32	42	180	150	50	1.59
1 x 16	20003793	5DH21125	10.8	11.8	35	47	253	240	67	2.54
1 x 25	20003794	5DH21135	12.7	13.7	55	69	354	375	89	3.98
1 x 35	20003795	5DH21145	14.3	15.2	61	76	465	525	111	5.57
1 x 50	20003796	5DH21155	16.5	17.4	70	87	642	750	141	7.95
1 x 70		5DH21165	18.6	19.6	78	98	864	1050	176	11.13
1 x 95	20003798	5DH21175	20.8	22.1	88	111	1117	1425	211	15.11
1 x 120	20003799	5DH21185	22.8	24.4	98	122	1399	1800	247	19.08
1 x 150	20015048	5DH21205	25.2	27.2	109	136	1729	2250	285	23.85
1 x 185	20003801	5DH21215	27.6	29.8	119	149	2095	2775	324	29.42
1 x 240	20015049	5DH21225	30.6	32.9	132	165	2684	3600	387	38.16
1 x 300	20008215	5DH21235	33.5	37	148	185	3315	4500	445	47.7
2 x 1	20003803	5DH22015	7.7	8.6	26	34	83	30	14	0.16
2 x 1,5	20003804	5DH22025	8.5	9.6	29	38	106	45	18	0.24
2 x 2,5	20015097	5DH22055	10.2	11.2	34	45	152	75	24	0.4
2 x 4	20003809	5DH22065	11.8	12.8	51	64	213	120	32	0.64
2 x 6		5DH22075	13.1	14.5	58	73	278	180	41	0.95
3 G 1	20003812	5DH23035	8.3	9.3	28	37	102	45	15	0.16
3 G 1,5	20003814	5DH23045	9.2	10.3	31	41	131	67.5	19	0.24
3 G 2,5	20003816	5DH23055	10.9	12	36	48	189	112.5	25	0.4
3 G 4	20003818	5DH23065	12.7	13.7	55	69	262	180	33	0.64
3 G 6	20003819	5DH23075	14.1	15.1	60	76	344	270	42	0.95
3 G 10	20003820	5DH23105	19.1	20.7	83	104	644	450	59	1.59
3 x 1,5	20003937	5DH28554	9.2	10.3	31	41	131	67.5	15	0.24
3 x 2,5		5DH28564	10.9	12	36	48	195	112.5	20	0.4
3 x 4		5DH28574	12.7	13.9	56	70	270	180	28	0.64
3 x 6		5DH28584	14.1	15.6	62	78	355	270	34	0.95
3 x 10		5DH28604	19.1	21.1	84	106	635	450	48	1.59
3 x 16		5DH28314	21.8	25.2	101	126	950	720	64	2.54
3 x 25		5DH28324	26.1	27.9	112	140	1260	1125	85	3.98
3 x 35	20003934	5DH28054	29.3	30.9	124	155	1651	1575	105	5.57
3 x 50		5DH28064	34.1	35.6	142	178	2252	2250	131	7.95
3 x 70		5DH28614	38.4	40.7	163	204	3131	3150	163	11.13
3 x 95		5DH27734	43.3	46	184	230	3900	4275	194	15.11
4 G 1	20008313	5DH24035	9.2	10.1	30	40	125	60	12	0.16
4 G 1,5	20003826	5DH24045	10.2	11.3	34	45	159	90	15	0.24
4 G 2,5	20003828	5DH24055	12.1	13	52	65	231	150	21	0.4
4 G 4	20015051	5DH24065	14	14.9	60	75	329	240	29	0.64
4 G 6	20015052	5DH24075	15.7	16.7	67	84	440	360	35	0.95
4 G 10	20015093	5DH24105	20.9	22.4	90	112	799	600	49	1.59
4 G 16	20015094	5DH24125	23.8	25.4	102	127	1096	960	66	2.54
4 G 25	20015095	5DH24135	28.9	30.8	123	154	1627	1500	87	3.98
4 G 35	20015096	5DH24145	32.5	34	136	170	2108	2100	108	5.57
4 G 50	20003838	5DH24155	37.7	40	160	200	2908	3000	136	7.95

x = without ye/gn core; G = with ye/gn core

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
4 G 70	20003839	5DH24165	42.7	44.9	180	225	3856	4200	169	11.13
4 G 95	20003840	5DH24175	48.4	51.1	204	256	5062	5700	200	15.11
4 G 120	20003841	5DH24185	53	56.5	226	283	6262	7200	234	19.08
5 G 1	20003843	5DH25035	10.2	11.1	33	44	157	75	13	0.14
5 G 1,5	20003845	5DH25045	11.2	12.4	50	62	194	112.5	16	0.21
5 G 2,5	20003847	5DH25055	13.3	14.4	58	72	280	187.5	22	0.36
5 G 4	20015098	5DH25065	15.6	16.6	66	83	407	300	29	0.57
5 G 6	20015099	5DH25075	17.5	18.5	74	93	542	450	36	0.86
5 G 10	20015100	5DH25105	22.9	24.7	99	124	972	750	51	1.43
5 G 16	20015101	5DH25125	26.4	28.4	114	142	1352	1200	67	2.29
5 G 25	20003857	5DH25135	32	34	136	170	1999	1875	89	3.98
5 G 35	20003858	5DH25145	35.7	37.9	152	190	2554	2625	119	5.57
5 G 50	20003859	5DH25155	41.8	43.7	175	219	3515	3750	162	7.95
5 G 70	20003860	5DH25165	47.5	49.9	200	250	4831	5250	209	11.13
5 G 95	20003861	5DH25175	54	56.8	227	284	6262	7125	266	15.11
7 G 1,5	20015113	5DH25805	14.7	16.7	63	79	32	157.5	9	0.24
8 G 1,5		5DH29405	17.5	19.5	78	98	450	180	9	0.24
10 G 1,5	20003965	5DH29385	16.4	18.4	74	92	443	225	8	0.24
12 G 1,5	20003864	5DH25835	17.2	19.2	77	96	482	270	7	0.24
18 G 1,5		5DH22585	20.7	22.7	88	110	689	405	6	0.24
24 G 1,5	20003969	5DH29435	24.3	27.3	104	130	919	540	6	0.24
7 G 2,5	20015114	5DH25905	17.1	19.1	73	91	456	262.5	13	0.4
8 G 2,5		5DH25915	17.3	19.3	77	97	519	300	12	0.4
10 G 2,5	20003867	5DH25925	19.7	21.7	87	109	647	375	11	0.4
12 G 2,5	20003868	5DH25935	20.6	22.6	88	111	692	450	10	0.4
14 G 2,5	20003869	5DH2	21.2	25.2	91.2	114	785	525	9	0.4
18 G 2,5	20003870	5DH25955	24.4	27.4	105	131	993	675	9	0.4
24 G 2,5	20003871	5DH25965	28.8	31.8	121	151	1331	900	8	0.4

(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, on surface acc. to VDE 0298-4
X = without gn/ye core, G = with gn/ye core

NOTES

Industry cables

LOW VOLTAGE - RUBBER SHEATHED CABLES HALOGEN-FREE

H07ZZ-F
halogen-free and low smoke

Anwendung
Für die Verwendung in Innenräumen und die vorübergehende Verwendung im Freien. Speziell für Anwendungsfälle, bei denen im Brandfall nur geringe Mengen von Rauch entstehen dürfen.
Darüber hinaus gelten die allgemeinen Festlegungen in DIN EN 50565-3-21

Globale Daten

Bauartkurzzeichen	H07ZZ-F
Norm	DIN EN 50525-3-21

Aufbaukriterien

Leiterform	Rund (R)
Leiter	Kupfer blank, flexibel (F), Leiterklasse 5 nach IEC 60228
Isolierung	Extrudierte Gummimischung gem. DIN EN 50363-5, EI8
Aderkennzeichnung	bis 5 Adern: farbig nach HD 308 (DIN VDE 0293-308) ab 6 Adern: nach EN50525-1
Außenmantel	Extrudierte Gummimischung gem. DIN EN 50363-5
Außenmantelfarbe	Schwarz

Elektrische Parameter

Spannungsklasse	450/750 V
Maximal zulässige Spannung AC	0,476/0,825 kV
Maximal zulassige Spannung DC	0,619/1,238
Prüfwechselspannung	2,5 kV

Chemische Parameter

Halogenfreiheit, Korrosivität der Brandgase	DIN EN 50363-5
Rauchgasdichte	DIN EN 61034-2
Flammwidrigkeit	DIN EN 60332-3-24
Ölbeständigkeit	DIN EN 60811-404
UV-Beständigkeit	Leitung ist UV-beständig

Thermische Parameter

Max. zulässige Leitertemperatur	90 °C
Max. Kurzschlusstemperatur	250 °C
Umgebungstemperatur feste Installation min.	-25 °C
Umgebungstemperatur feste Installation max.	80 °C
Umgebungstemp. flex. Anwendung min.	-5 °C
Umgebungstem. flex. Anwendung max.	80 °C

Mechanische Parameter

Zugbelastbarkeit am Leiter max.	15 N/mm²
Biegeradius min.	Nach DIN VDE 0298 Teil 3

Aderzahl x Nennquerschnitt	Artikel-nummer	MLFB Nummer	Außen-durch-messer min. mm	Außen-durch-messer max. mm	Biege-radius fest verlegt, min. mm	Biege-radius bei Bewe-gung min. mm	Zugbe-lastung max. N	Strom-belast-barkeit (1) A	Kurz-schluss-strom (Leiter) kA
1 x 1.5		5DH9801	5.8	7.1	28	43	22.5	24	0.24
1 x 2.5		5DH9802	6.4	7.9	32	47	37.5	32	0.36
1 x 4		5DH9803	7.3	9	36	54	60	42	0.57
1 x 6		5DH9804	8	9.8	39	59	90	54	0.86
1 x 10		5DH9805	9.3	11.9	48	71	150	73	1.43
1 x 16		5DH9806	10.6	13.4	54	80	240	98	2.29
1 G 16	20006438		10.6	13.4	54	80	240	98	2.29
1 x 35	20006439	5DH9808	13.7	17.9	72	107	525	158	5.01
1 x 50	20006440	5DH9809	15.9	20.6	82	124	750	198	7.15
1 x 70		5DH9810	18.1	23.3	93	140	1050	245	10.02
1 x 95	20006441	5DH9811	20.6	26	104	156	1425	292	13.54
1 x 120	20006442	5DH9812	22.9	28.6	114	172	1800	344	17.17
1 x 150	20006443	5DH9813	25	31.4	126	188	2250	391	21.46
1 x 185	20006444	5DH9814	27.6	34.4	138	206	2775	448	26.47
1 x 240	20006445	5DH9815	30.6	38.3	153	230	3600	528	34.34
1 x 300	20006446	5DH9816	33.5	41.9	168	251	4500	608	42.93
1 x 400	20204586	5DH9817	37.4	46.8	187	281	6000	726	57.23
1 x 500		5DH9818	41.3	52	208	312	7500	830	71.54
2 x 1		5DH9820	7.7	10	40	60	30	19	0.16
2 x 1.5	20163227	5DH9821	8.5	11	44	66	45	24	0.24
2 x 2.5	20006447	5DH9822	10.2	13.1	52	79	75	32	0.36
2 x 4		5DH9823	11.8	15.1	60	91	120	42	0.57
2 x 6		5DH9824	13.1	16.8	67	101	180	54	0.86
2 x 10		5DH9825	17.7	22.6	90	136	300	73	1.43
2 x 16		5DH9826	20.2	25.7	103	154	480	98	2.29
2 x 25		5DH9827	24.3	30.7	123	184	750	129	3.58
3 G 1		5DH9840	8.3	10.7	43	64	45	19	0.16
3 G 1.5		5DH9841	9.2	11.9	48	71	67.5	24	0.24
3 G 2.5		5DH9842	10.9	14	56	84	112.5	32	0.36
3 G 4		5DH9843	12.7	16.2	65	97	180	42	0.57
3 G 6		5DH9844	14.1	18	72	108	270	54	0.86
3 G 10		5DH9845	19.1	24.2	97	145	450	73	1.43
3 G 16		5DH9846	21.8	27.6	110	166	720	98	2.29
3 G 25		5DH9847	26.1	33	132	198	1125	129	3.58
3 G 35		5DH9848	29.3	37.1	148	223	1575	158	5.01
3 G 50		5DH9849	34.1	42.9	172	257	2250	198	7.15
3 G 70		5DH9850	38.4	48.3	193	290	3150	245	10.02
3 G 95		5DH9851	43.3	54	216	324	4275	292	13.54
3 G 120		5DH9852	47.4	60	240	360	5400	344	17.17
3 G 150		5DH9853	52	66	264	396	6750	391	21.46
3 G 185		5DH9854	57	72	288	432	8325	448	26.47
3 G 240		5DH9855	65	82	328	492	10800	528	34.34
4 G 1		5DH9860	9.2	11.9	48	71	60	19	0.16
4 G 1.5		5DH9861	10.2	13.1	52	79	90	24	0.24
4 G 2.5		5DH9862	12.1	15.5	62	93	150	32	0.36
4 G 4		5DH9863	14	17.9	72	107	240	42	0.57
4 G 6		5DH9864	15.7	20	80	120	360	54	0.86
4 G 10		5DH9865	20.9	26.5	106	159	600	73	1.43

x = without ye/gn core; G = with ye/gn core

Aderzahl x Nennquerschnitt	Artikel-nummer	MLFB Nummer	Außen-durch-messer min. mm	Außen-durch-messer max. mm	Biege-radius fest verlegt, min. mm	Biege-radius bei Bewe-gung min. mm	Zugbe-lastung max. N	Strom-belast-barkeit (1) A	Kurz-schluss-strom (Leiter) kA
4 G 16	20006448	5DH9866	23.8	30.1	120	181	960	98	2.29
4 G 25	20006467	5DH9867	28.9	36.6	146	220	1500	129	3.58
4 G 35	20006468	5DH9868	32.5	41.1	164	247	2100	158	5.01
4 G 50	20006469	5DH9869	37.7	47.5	190	285	3000	198	7.15
4 G 70	20006470	5DH9870	42.7	54	216	324	4200	245	10.02
4 G 95	20006449	5DH9871	48.4	61	244	366	5700	292	13.54
4 G 120		5DH9872	53	66	264	396	7200	344	17.17
4 G 150		5DH9873	58	73	292	438	9000	391	21.46
4 G 185		5DH9874	64	80	320	480	11100	448	26.47
5 G 1	20006471	5DH9880	10.2	13.1	52	79	75	15	0.16
5 G 1.5		5DH9881	11.2	14.4	58	86	112.5	18	0.24
5 G 2.5		5DH9882	13.3	17	68	102	187.5	26	0.36
5 G 4	20006474	5DH9883	15.6	19.9	80	119	300	34	0.57
5 G 6	20006475	5DH9884	17.5	22.2	89	133	450	44	0.86
5 G 10	20006476	5DH9885	22.9	29.1	116	175	750	61	1.43
5 G 16	20006477	5DH9886	26.4	33.3	133	200	1200	82	2.29
5 G 25		5DH9887	32	40.4	162	242	1875	108	3.58
6 G 1.5		5DH9700	13.4	17.2	69	103	135	18	0.24
7 G 1.5	20006450	5DH9701	14.7	18.7	75	112	157.5	18	0.24
12 G 1.5		5DH9702	17.6	22.4	90	134	270	18	0.24
18 G 1.5		5DH9703	20.7	26.3	105	158	405	18	0.24
19 G 1.5	20006451	5DH9704	20.7	26.3	105	158	427.5	18	0.24
24 G 1.5		5DH9705	24.3	30.7	123	184	540	18	0.24
36 G 1.5		5DH9706	27.8	35.2	141	211	810	18	0.24
6 G 2.5		5DH9707	15.7	20	80	120	225	26	0.4
7 G 2.5	20006455	5DH9708	17.1	21.8	87	131	262.5	26	0.4
12 G 2.5		5DH9709	20.6	26.2	105	157	450	26	0.4
18 G 2.5		5DH9710	24.4	30.9	124	185	675	26	0.4
24 G 2.5		5DH9711	28.8	36.4	146	218	900	26	0.4
36 G 2.5		5DH9712	33.2	41.8	167	251	1350	26	0.4
6 G 4		5DH9713	18.2	23.2	93	139	360	34	0.64
7 G 4		5DH9714	20.1	25.5	102	153	420	34	0.64
12 G 4		5DH9715	24.4	30.9	124	185	720	34	0.64
18 G 4		5DH9716	28.8	36.4	146	218	1080	34	0.64

X = ohne gn/ge Ader, G = mit gn/ge Ader
(1) Die Angaben zur Strombelastbarkeit gelten bei Dauerbetrieb mit Gleich- bzw. Wechsel- oder Drehstrom mit 50 bis 60Hz, bei 30°C Umgebungstemperatur, an Flächen liegend, zwei oder drei Adern belastet, bei vieladrigen Leitungen alle Adern belastet. VDE 0298

NOTES

Industry cables

LOW VOLTAGE -
PUR SHEATHED RUBBER CABLES

Designation	Standard	Resistance to oil	Temp. at conductor max.	Temp. fully flex. operation min.	Rated voltage
H05BQ-F	DIN EN 50525-2-21	DIN EN 60811-404	90°C	-40°C	300/500 V
H07BQ-F singlesheath	DIN EN 50525-2-21	DIN EN 60811-404	90°C	-40°C	450/750 V
H07BQ-F duosheath	DIN EN 50525-2-21	DIN EN 60811-404	90°C	-40°C	450/750 V

H05BQ-F
PUR cable

Application
As flexible power cables for high mechanical stresses, in particular for abrasion und grinding stresses. For use in dry, damp and wet rooms and outdoors, for connecting electrical tools and lamps also on construction sites. In other respects the specifications of DIN EN 50565-2 apply.

Global data

Type designation	H05BQ-F
Standard	EN 50525-2-21

Design features

Conductor	bare copper, round (R), fine stranded class 5 (F) acc. to DIN EN 60228 / IEC 60228
Insulation	Rubber, compound type EI6 acc. to DIN EN 50363-1
Color code	colored acc. to HD 308 (DIN VDE 0293-308)
Outer sheath	Polyurethane elastomer, compound type TMPU acc. to DIN EN 50363-10-2
Outer Sheath Colour	Orange

Electrical parameters

Rated voltage	300/500V
Max. permissible operating voltage AC	0.318/0.55 kV
Max. permissible operating voltage DC	0.413/0.825 kV
AC test voltage	2 kV

Chemical parameters

Resistance to oil	DIN EN 60811-404
Ozone resistance	DIN EN 50396

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-40 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
2 x 0.75	20006089	5DH6310	5.7	7.4	20	26	22.5	6	0.12
2 x 1	20005898	5DH6211	6.1	8	21	28	30	10	0.16
3 G 0.75			6.2	8.1	22	29	33.75	6	0.12
3 G 1	20005850	5DH6314	6.5	8.5	23	30	45	10	0.16
4 G 0.75	20005861	5DH6214	6.8	8.8	23	31	45	6	0.12
4 G 1	20005865	5DH6215	7.1	9.3	25	33	60	10	0.16
5 G 0.75	20005878	5DH6216	7.6	9.9	26	35	56.25	6	0.12
5 G 1	20005881	5DH6217	8	10.3	28	37	75	10	0.16

X = without gn/ye core, G = with gn/ye core
(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, on surface acc. to VDE 0298-4

H07BQ-F
PUR Singlesheath

Application
As flexible power cables for high mechanical stresses, in particular for abrasion und grinding stresses. For use in dry, damp and wet rooms and outddors, for connecting electrical tools and lamps also on construction sites. In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	FLEXIPUR
Type designation	H07BQ-F
Standard	EN 50525-2-21

Design features

Conductor	bare copper, round (R), fine stranded class 5 (F) acc. to DIN EN 60228 / IEC 60228
Insulation	Rubber, compound type EI6 acc. to DIN EN 50363-1
Color code	coloured acc. to HD 308 (DIN VDE 0293-308)
Outer sheath	Polyurethan, compound type TMPU acc. to EN 50363-10-2 within interstice
Outer Sheath Colour	Orange

Electrical parameters

Rated voltage	450/750V
Max. permissible operating voltage AC	0.476/0.825 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC test voltage	2.5 kV

Chemical parameters

Resistance to oil	DIN EN 60811-404
Ozone resistance	DIN EN 50396

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-40 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Outer dia-meter nom. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
2 x 1		5DH6439	6.9	9	8	27	32		30	14	0.16
2 x 1.5		5DH6441	7.6	9.8	8.7	29	35	111	45	18	0.24
2 x 2.5			9	11.6	10.3	35	41	140	75	24	0.4
2 x 4		5DH6442	10.6	13.7	12.1	55	61	201	120	32	0.64
2 x 6		5DH6443	11.8	15.1	13.5	60	68		180	41	0.95
2 x 10		5DH6444	15.6	19.9	17.8	80	89		300		1.59
2 x 16		5DH6445	17.9	22.8	20.4	91	122		480		
3 G 1		5DH6407	7.3	9.5	8.4	29	34		45	15	0.16
3 G 1.5	20005927	5DH6409	8	10.4	9.2	31	37	116	67.5	15	0.24
3 G 2.5	20005929	5DH6415	9.6	12.4	11	50	55	166	112.5	20	0.4
3 G 4		5DH6417	11.3	14.5	12.9	58	65	240	180	28	0.64
3 G 6	20179948		12.8	16.3	14.6	65	73		270	34	0.95
3 G 10		5DH6419	16.8	21.4	19.1	86	96		450	48	1.59
3 G 16		5DH6420	19.5	24.7	22.1	99	133		720	64	2.54
4 G 1		5DH6450	8.2	10.7	9.5	32	38		60	12	0.16
4 G 1.5		5DH6451	9	11.6	10.3	35	41	148	90	15	0.24
4 G 2.5		5DH6452	10.7	13.8	12.3	41	62	213	150	21	0.4
4 G 4		5DH6453	12.7	16.2	14.5	65	73	296	240	29	0.64
4 G 6		5DH6454	14.2	18.1	16.2	72	81	462	360	35	0.95
4 G 10		5DH6455	18.6	23.6	21.1	94	127	764	600	49	1.59
4 G 16		5DH6456	21.3	27	24.2	108	145	1092	960	66	2.54
5 G 1		5DH6423	9.2	11.9	10.6	48	42		75	13	0.14
5 G 1.5	20005931	5DH6424	9.8	12.7	11.3	51	45	173	112.5	16	0.21
5 G 2.5	20005933	5DH6425	11.9	15.3	13.6	61	68	248	187.5	22	0.36
5 G 4	20005934	5DH6426	14.1	17.9	16	72	80	361	300	29	0.57
5 G 6	20007249	5DH6429	15.7	20	17.9	80	107	542	450	36	0.86
5 G 10	20005935	5DH6430	20.4	25.9	23.2	104	139	775	750	51	1.43
5 G 16	20005936	5DH6431	23.7	30	26.9	120	161	1206	1200	67	2.29

(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, on surface acc. to VDE 0298-4
X = without gn/ye core, G = with gn/ye core

H07BQ-F
PUR Duosheath

Application
As flexible power cables for high mechanical stresses, in particular for abrasion und grinding stresses. For use in dry, damp and wet rooms and outddors, for connecting electrical tools and lamps also on construction sites. In other respects the specifications of DIN EN 50565-2 apply..

Global data

Brand	FLEXIPUR
Type designation	H07BQ-F
Standard	EN 50525-2-21

Design features

Conductor Material	Bare copper
Conductor	bare copper, round (R), fine stranded class 5 (F) acc. to EN 60228
Insulation	Rubber, compound type EI6 acc. to EN 50363-1
Color code	coloured acc. to HD 308 (DIN VDE 0293-308)
Inner sheath	rubber- or thermoplastic compound as filler in interstice
Outer sheath	Polyurethane elastomere, compound type TMPU acc. to EN 50363-10-2
Outer Sheath Colour	Orange

Electrical parameters

Rated voltage	450/750V
Max. permissible operating voltage AC	0.476/0.825 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC test voltage	2.5 kV

Chemical parameters

Resistance to oil	DIN EN 60811-404
Ozone resistance	DIN EN 50396

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-40 °C

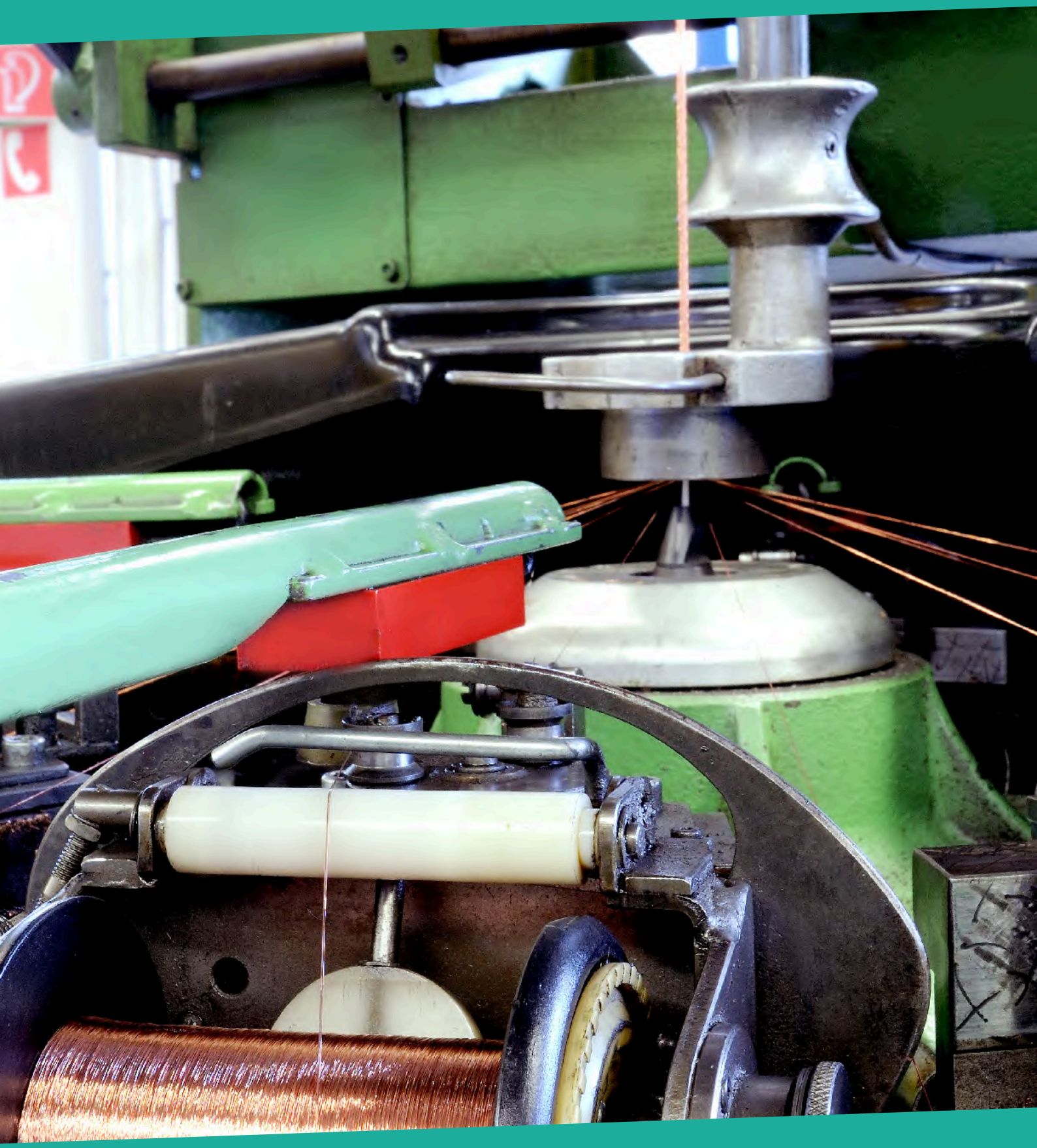
Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
2 x 1		5DH6231	6.9	9	27	32		30	14	0.16
2 x 1.5	20005901	5DH6232	7.6	9.8	29	35	111	45	18	0.24
2 x 2.5	20005904	5DH6233	9	11.6	35	41	140	75	24	0.4
2 x 4	20038285	5DH6234	10.6	13.7	55	61	201	120	32	0.64
2 x 6		5DH6235	11.8	15.1	60	68		180	41	0.95
2 x 10		5DH6236	15.6	19.9	80	89		300		
2 x 16		5DH6237	17.9	22.8	91	122		480	67	2.54
3 G 1		5DH6241	7.3	9.5	29	34		45	15	0.16
3 G 1.5	20005854	5DH6242	8	10.4	31	37	116	67.5	15	0.24
3 G 2.5	20005857	5DH6243	9.6	12.4	50	55	166	112.5	20	0.4
3 G 4	20005860	5DH6244	11.3	14.5	58	65	240	180	28	0.64
3 G 6	20179948	5DH6245	12.8	16.3	65	73		270	34	0.95
3 G 10		5DH6246	16.8	21.4	86	96		450	48	1.59
3 G 16		5DH6247	19.5	24.7	99	133		720	64	2.54
4 G 1		5DH6251	8.2	10.7	32	38		60	12	0.16
4 G 1.5	20005868	5DH6252	9	11.6	35	41	148	90	15	0.24
4 G 2.5	20005871	5DH2253	10.7	13.8	41	62	213	150	21	0.4
4 G 4	20005874	5DH2254	12.7	16.2	65	73	296	240	29	0.64
4 G 6	20005875	5DH2255	14.2	18.1	72	81	462	360	35	0.95
4 G 10	20005876	5DH2256	18.6	23.6	94	127	764	600	49	1.59
4 G 16	20005877	5DH2257	21.3	27	108	145	1092	960	66	2.54
5 G 1		5DH6261	9.2	11.9	48	42		75	13	0.14
5 G 1.5	20005884	5DH6262	9.8	12.7	51	45	173	112.5	16	0.21
5 G 2.5	20005891	5DH6263	11.9	15.3	61	68	248	187.5	22	0.36
5 G 4	20005894	5DH6264	14.1	17.9	72	80	361	300	29	0.57
5 G 6	20005895	5DH6265	15.7	20	80	107	542	450	36	0.86
5 G 10	20005896	5DH6266	20.4	25.9	104	139	775	750	51	1.43
5 G 16	20005897	5DH6267	23.7	30	120	161	1206	1200	67	2.29

X = without gn/ye core, G = with gn/ye core
(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, on surface acc. to VDE 0298-4

Industry cables



LOW VOLTAGE - WELDING CABLES

Designation	Standard	Conductor	Fire performance	Resistance to oil	Rated voltage
ARCOFLEX H01N2-D	DIN EN 50525-2-81	Multiflexible class 6 +	DIN EN 60332-1-2	DIN EN 60811-404	100/100 V
FLEXIPREN H01N2-E	DIN EN 50525-2-81	Multiflexible class 6 +	DIN EN 60332-1-2	DIN EN 60811-404	100/100 V

H01N2-D
ARCOFLEX

Application
These cables are intended for use with hand-held electrodes at 100V in dry, humid and moist rooms as well as outdoors, where the cables are subjected to high mechanical stresses.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	ARCOFLEX
Type designation	H01N2-D
Standard	EN50525-2-81

Design features

Conductor Material	Bare copper
Conductor class	Class 6, multiflexible (F)
Conductor	IEC 60228
Outer sheath	Cross-linked elastomeric special compound: requirements in accordance with DIN EN 50363-2-2: EM5
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	100/100V
Max. permissible operating voltage AC	0.110/0.110 kV
Max. permissible operating voltage DC	0.165/0.165 kV
AC test voltage	1 kV

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404

Thermal parameters

Max. permissible temperature at conductor	85 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
1 x 10	20079816	5DH43015	8.3	9.5	65	170	150	96	1.4
1 x 16	20004228	5DH43025	9.3	10.5	65	201	240	130	2.3
1 x 25	20004230	5DH43035	10.4	11.5	65	283	375	173	3.6
1 x 35	20004232	5DH43045	11.5	12.7	75	378	525	216	5
1 x 50	20004234	5DH43055	13.3	14.8	75	534	750	274	7.2
1 x 70	20004236	5DH43065	15.3	16.8	80	737	1050	341	10
1 x 95	20004237	5DH43075	17.1	18.6	90	961	1425	413	13.6
1 x 120	20004238	5DH43085	19.2	20.7	110	1219	1800	480	17.2
1 x 150	20004239	5DH43105	21.1	22.6	130	1500	2250	557	21.5
1 x 185	20004240	5DH43115	23.1	24.9	150	1817	2775	638	26.5
1 x 240	20079817	5DH43125	26.4	28.2	170	2450	3600		34.3

(1) acc. to VDE 0298 part 4, table 16

H01N2-E
FLEXIPREN

Application
These cables are intended for use with hand-held electrodes at 100V in dry, humid and moist rooms as well as outdoors, where the cables are subjected to high mechanical stresses.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	FLEXIPREN
Type designation	H01N2-E
Standard	EN50525-2-81

Design features

Conductor Material	Bare copper
Conductor class	claas E, extended flexibility (FF)
Conductor	IEC 60228
Outer sheath	Cross-linked elastomeric special compound: requirements in accordance with DIN EN 50363-2-2: EM5
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	100/100V
Max. permissible operating voltage AC	0.110/0.110 kV
Max. permissible operating voltage DC	0.165/0.165 kV
AC test voltage	1 kV

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404

Thermal parameters

Max. permissible temperature at conductor	85 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
1 x 10		5DH4322	6.2	7.8	45		150	96	1.4
1 x 16		5DH4312	7.3	9.1	45	201	240	130	2.3
1 x 25		5DH4313	8.6	10.8	45	283	375	173	3.6
1 x 35		5DH4314	9.8	12.3	50	378	525	216	5
1 x 50	20004241	5DH4315	11.9	14.8	50	534	750	274	7.2
1 x 70	20004242	5DH4316	13.6	17	55	737	1050	341	10
1 x 95	20004243	5DH4317	15.6	19.5	60	961	1425	413	13.6
1 x 120		5DH4318	17.2	21.6	75	1219	1800	480	17.2
1 x 150		5DH4319	18.8	23.5	90	1500	2250	557	21.5
1 x 185		5DH43	20.4	25.5	95	1817	2775	638	26.5
1 x 240		5DH43	23	28	100		3600		34.3

(1) acc. to VDE 0298 part 4, table 16

Industry cables

LOW VOLTAGE - HEAT RESISTANT CABLES

Designation	Standard	Fire performance	Resistance to oil	Temp. fully flex. operation min.	Max. conductor temp.	Approvals	Rated voltage
SINOTHERM(180) SIA/SIAF	PG specification	DIN EN 60332-1-2	DIN EN 60811-404	-50°C	180°C		300/500 V
SINOTHERM(180) SIAF	PG specification	DIN EN 60332-1-2	DIN EN 60811-404	-50°C	180°C		0.6/1 kV
SINOTHERM(180) H05SS-F	DIN EN 50525-2-83	DIN EN 60332-1-2	DIN EN 60811-404	-40°C	180°C	VDE	300/500 V
SINOTHERM(110) H07G-K	DIN EN 50525-2-42	-	-	-25°C	110°C	VDE	450/750 V
H07G-K (UL 758)	DIN EN 50525-2-42 AWM style 3343	- vertical flame test	-	-25°C	110°C 125°C	 UL	450/750 V UL: 600 V
SINOTHERM(110) H05GG-F	DIN EN 50525-2-21	-	-	-25°C	110°C	VDE	300/500 V

SIA/SIAF 300/500V
SINOTHERM (180)

Application
The cables SIA and SIAF are indented for use as fixed wiring, SIAF for wiring where limited flexing in operation is encountered.
• For internal wiring in switchgear, distribution boards, electric cookers, electrical machines, heating appliances and luminaries.
• In conduits which are either surface mounted, embedded on or in or under plaster, or enclosed within electrical installation ducts or within equipment housings.
• By virtue of their increased heat resistance, these cables are particularly suitable for use in ambient temperatures of over 55 °C.
Since silicone rubber is malleable and less durable than other insulating materials, these cables are not suitable for high mechanical stress, e.g. when cables laid across sharp edges.
In other respects the specifications of DIN VDE 0298-3 apply.

Global data

Type designation	SIA/SIAF
Standard	PRYSMIAN specification

Design features

Conductor	SIA = bare copper, round (R), solid claas 1 acc. to IEC 60228 SIAF = Copper, tinned, round (R), finely stranded (F), claas 5 acc. to IEC 60228
Insulation	Heat resistant, cross-linked silicone rubber compound, colour: reddish brown (unicolor) Other colors on request

Electrical parameters

Rated voltage	300/500V
Max. permissible operating voltage AC	0.318/0.55 kV
Max. permissible operating voltage DC	0.413/0.825 kV
AC Test Voltage	2 kV (5 Min.)

Chemical parameters

Flame propagation	DIN EN 60332-1-2

Thermal parameters

Max. operating temperature of the conductor	180°C
Max. short circuit temperature of the conductor	350°C (max. 1 sec.)
Ambient temperature for fix installation min.	-50 °C
Ambient temp. in fully flex. operation min.	-50 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
SIA									
1 x 1.5		5DR1 48	2.4	2.9	11	20	22.5	24	0.2
1 x 2.5		5DR1 58	3	3.4	14	31	37.5	32	0.3
1 x 4	20085685	5DR1 68	3.6	4.1	16	46	60	42	0.5
1 x 6		5DR1 78	4.1	4.6	18	64	90	54	0.8
SIAF									
1 x 0.75	20005224	5DR3 28	2.1	2.6	10	20	11.25	15	0.1
1 x 1		5DR3 38	2.3	2.7	11	31	15	19	0.13
1 x 1.5	20005226	5DR3 48	2.6	3	12	20	22.5	24	0.2
1 x 2.5	20163154	5DR3 58	3.2	3.6	15	31	37.5	32	0.3
1 x 4		5DR3 68	4	4.4	18	46	60	42	0.5
1 x 6	20163155	5DR3 78	4.6	5.1	20	64	90	54	0.8
1 x 10	20163156	5DR3 108	5.9	6.7	27	109	150	73	1.3
1 x 16	20163157	5DR3 128	7.5	8.2	41	178	240	98	2.1
1 x 25	20163158	5DR3 138	9.1	9.9	49	267	375	129	3.3
1 x 35	20163159	5DR3 148	10.3	11.5	58	360	525	158	4.6
1 x 50	20163160	5DR3 158	12.2	13.4	80	514	750	198	6.6
1 x 70		5DR3 168	13.9	15.5	91	707	1050	245	9.2

(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 150 °C ambient temperature, free in air

SIAF 0.6/1 kV
SINOTHERM (180)

Application
The cables SIAF are indented for wiring where limited flexing in operation is encountered.
• For internal wiring in switchgear, distribution boards, electric cookers, electrical machines, heating appliances and luminaries.
• In conduits which are either surface mounted, embedded on or in or under plaster, or enclosed within electrical installation ducts or within equipment housings.
• By virtue of their increased heat resistance, these cables are particularly suitable for use in ambient temperatures of over 55 °C.
Since silicone rubber is malleable and less durable than other insulating materials, these cables are not suitable for high mechanical stress, e.g. when cables laid across sharp edges.
In other respects the specifications of DIN VDE 0298-3 apply.

Global data

Type designation	SIA/SIAF
Standard	PRYSMIAN specification

Design features

Conductor	Copper, tinned, round (R), finely stranded (F), claas 5 acc. to IEC 60228
Insulation	Heat resistant, cross-linked silicone rubber compound, colour: reddish brown (unicolor) Other colors on request

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC Test Voltage	2.5 kV (5 Min.)

Chemical parameters

Flame propagation	DIN EN 60332-1-2

Thermal parameters

Max. operating temperature of the conductor	180°C
Max. short circuit temperature of the conductor	350°C (max. 1 sec.)
Ambient temperature for fix installation min.	-50 °C
Ambient temp. in fully flex. operation min.	-50 °C

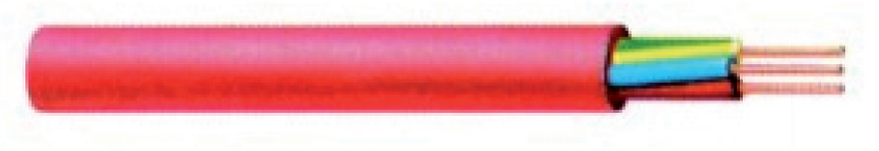
Mechanical parameters

Max. tensile load on the conductor	15 N/mm²

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
1 x 1.5	20005822	5DR3 514	2.9	3.4	13	20	22.5	24	0.2
1 x 2.5	20005230	5DR3 515	3.6	4	16	31	37.5	32	0.3
1 x 4	20005231	5DR3 516	4.2	4.7	19	46	60	42	0.5
1 x 6	20005232	5DR3 517	4.8	5.2	21	64	90	54	0.8
1 x 10	20005233	5DR3 518	6.2	6.9	28	109	150	73	1.3
1 x 16	20005234	5DR3 520	7.8	8.6	43	178	240	98	2.1
1 x 25	20005235	5DR3 521	9.4	10.1	51	267	375	129	3.3
1 x 35	20005236	5DR3 522	10.6	11.8	59	360	525	158	4.6
1 x 50	20005237	5DR3 523	12.3	13.5	81	514	750	198	6.6
1 x 70	20005238	5DR3 524	14.2	15.4	92	707	1050	245	9.2
1 x 95	20005239	5DR3 525	15.3	16.8	101	923	1425	292	12.5

(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 150 °C ambient temperature, free in air

H05SS-F
SINOTHERM (180)



Application
The cables are suitable for: Used in high temperatures, for fixed installations in and on lamps and in appliances, especially when the equipment is to have a cable with both insulation and sheath. This cable may be damaged by contact with sharp edges and by abrasion. Care should be taken to avoid this in installation and in use.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	SINOTHERM (180)
Type designation	H05SS-F
Standard	VDE Marks Approval 40001904
Standard	EN 50525-2-83

Design features

Conductor Material	Bare copper
Conductor	Copper, finely stranded (F), class 5 in accordance with DIN VDE 0295 / IEC 60228
Insulation	SIR based compound EI2 in accordance with EN 50363-1
Color code	colored in accordance with HD 308 (DIN VDE 0293-308)
Outer sheath	heat resistant sheath compound EM9, base SIR, in accordance with EN 50363-2-1
Outer Sheath Colour	reddish brown

Electrical parameters

Rated voltage	300/500V
Max. permissible operating voltage AC	0.318/0.55 kV
Max. permissible operating voltage DC	0.413/0.825 kV
AC test voltage	2 kV
Duration of AC test voltage	15 min.

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404

Thermal parameters

Max. operating temperature of the conductor	180 °C
Max. short circuit temperature of the conductor	350 °C (max. 5 s)
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-40 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
2x0.75		5DR52285	5.7	6.7	20	20	46	22.5	12	99
2x1		5DR52385	6.1	7.2	22	29	55	30	15	132
2x1.5		5DR52485	7.7	8.7	26	35	82	45	18	198
2x2.5	20008123	5DR52585	9.1	10.1	30	40	118	75	26	330
2x4		5DR52685	10.6	11.9	36	48	160	120	34	528
2x6		5DR52785	11.9	12.9	39	52	221	180	44	792
3G 0.75		5DR53285	6.2	7.2	22	29	58	33.75	12	99
3G 1		5DR53385	6.5	7.5	23	30	66	45	15	132
3G 1.5	20005241	5DR53485	8.2	9.2	28	37	98	67.5	18	198
3G 2.5	20005243	5DR53585	9.7	10.7	43	54	143	112.5	26	330
3G 4		5DR53685	11.2	12.2	49	61	205	180	34	528
3G 6		5DR53785	12.7	13.7	55	69	281	270	44	792
4G 0.75		5DR54285	6.8	7.8	23	31	70	45	12	99
4G 1		5DR54385	7.1	8.1	24	32	81	60	15	132
4G 1.5	20005244	5DR54485	9.2	10.2	31	41	125	90	18	198
4G 2.5	20005245	5DR54585	10.8	11.8	47	59	184	150	26	330
4G 4		5DR54685	12.5	13.5	54	68	265	240	34	528
4G 6		5DR54785	14.1	15.1	60	76	361	360	44	792
5G 0.75		5DR55285	7.6	8.6	26	26	88	56.25	12	99
5G 1		5DR55385	8	9	27	27	102	75	15	132
5G 1.5	20005246	5DR55485	10	11	44	55	152	112.5	18	198
5G 2.5		5DR55585	12	13	52	65	328	187.5	26	330

(1) Current-carrying capacitiy: The values are valid for a cable in permanent operation with DC or AC with 50 up to 60Hz up to 150°C ambient temperature, touching a surface, two or three cores loaded
x = without ye/gn core, G = with ye/gn core

H07G-K
SINOTHERM(110)

Application
Designed for use at ambient temperatures above 55°C. Applications include the internal wiring of luminaries, heating applications, electrical machines, switchgear and distribution boards, as well as protected, fixed installation in dry indoor areas. Core cables H07G are alowed for use in devices to a rated voltage Uo/U 600/1000V AC or Uo 750V DC.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	SINOTHERM (110)
Type designation	H07G
Standard	EN 50525-2-42

Design features

Conductor	Copper, tinned, round (R), fine stranded (F), class 5 DIN EN 60228 (IEC 60228)
Insulation	Heat resistant insulation based on synthetic rubber, EI3 acc. DIN EN 50363-1
Color code	black, all basic colors possible

Electrical parameters

Rated voltage	450/750V
Max. permissible operating voltage AC	0.476/0.825 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC test voltage	2.5 kV
Duration of AC test voltage	15 min.
Insulation resistance at 20°C min.	22 MΩxkm

Thermal parameters

Max. permissible temperature at conductor	110 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
1 x 1.5	20055250	5DR70535	3	3.7	13.6	20	22.5	24	0.2
1 x 2.5	20055251	5DR70545	3.6	4.5	16.4	31	37.5	32	0.33
1 x 4	20057163	5DR70555	4.3	5.4	19.6	46	60	42	0.53
1 x 6	20007731	5DR70565	4.8	6	21.6	64	90	54	0.79
1 x 10	20055077	5DR70575	6	7.6	27.2	109	150	73	1.3
1 x 16	20058460	5DR70605	7.1	8.9	32	178	240	98	2.1
1 x 25	20005273	5DR70615	8.8	11	39.6	267	375	129	3.3
1 x 35	20005274	5DR70625	10.1	12.6	45.6	360	525	158	4.6
1 x 50	20005275	5DR70635	11.9	14.9	53.6	514	750	198	6.6
1 x 70	20005276	5DR70645	13.6	17	61.2	707	1050	245	9.2
1 x 95	20005277	5DR70655	15.5	19.3	69.6	923	1425	292	12.5
1 x 120	20061620	5DR70665	17.1	21.4	77.2	1165	1800	344	15.8
1 x 150	20171096	5DR70675	19	23.8	85.6	1435	2250	391	19.8
1 x 185		5DR70685	21	26.3	94.8	1754	2775	448	24.4
1 x 240	20171097	5DR70705	23.9	29.9	107.6	2306	3600	528	31.7

(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 80 °C ambient temperature, free in air, acc. to VDE 0298-4

H07G-K UL3343

Heat resistant single core cable

Application

Designed for use at ambient temperatures above 55°C. Applications include the internal wiring of luminaries, heating applications, electrical machines, switchgear and distribution boards, as well as protected, fixed installation in dry indoor areas.Core cables H07G are alowed for use in devices to a rated voltage Uo/U 600/1000V AC or Uo/U 750/1500V DC.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Type designation	H07G
Standard	EN 50525-2-42 UL Style 3343, AWM 758, File E250813

Design features

Conductor	Copper, tinned, round (R), fine stranded (F), class 5 DIN EN 60228 (IEC 60228)
Insulation	Heat resistant insulation based on synthetic rubber, EI3 acc. EN 50363-1
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	450/750V
Max. permissible operating voltage AC	0.476/0.825 kV
Maximum permissible operating voltage AC acc. to UL	0,6 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC test voltage	2.5 kV

Thermal parameters

Ambient temperature fix installation max. (UL)	125 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-30 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²

Number of cores x cross section	Part number	Single wire diameter mm	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Permis-sible tensile force max. N	Current carrying capacity (1) A
1 x 1.5	20076452	0.25	3	3.7	15	22.5	24
1 x 2.5	20074238	0.25	3.6	4.5	18	37.5	32
1 x 4		0.3	4.3	5.4	22	60	42
1 x 6		0.3	4.8	6	24	90	54
1 x 10		0.4	6	7.6	30	150	73
1 x 16		0.4	7.1	8.9	36	240	98
1 x 25		0.4	8.8	11	44	375	129
1 x 35		0.4	10.1	12.6	50	525	158
1 x 50		0.4	11.9	14.9	60	750	198
1 x 70		0.5	13.6	17	68	1050	245
1 x 95		0.5	15.5	19.3	77	1425	292
1 x 120		0.5	17.1	21.4	86	1800	344
1 x 150		0.5	19	23.6	94	2250	391
1 x 185		0.5	21	26.3	105	2775	448
1 x 240		0.5	23.9	29.9	120	3600	528

(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 80 °C ambient temperature, free in air acc. to VDE 0298-4
different colors on request

H05GG-F
SINOTHERM (110)

Application
Application include the flexible power supply connection of heating appliances, e.g. storage heaters. Designed for use at temperatures above 55°C in dry, damp and wet indoor areas as well as outdoor conditions of medium mechanical stress.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Type designation	H05GG-F
Standard	EN 50525-2-21

Design features

Conductor	Copper, tinned, round (R), finely stranded (F), claas 5 acc.to IEC 60228
Insulation	elastomeric compound, type EI3 acc. to EN 50363-1
Color code	acc. to EN 50525-1
Outer sheath	elastomeric compound type EM4 acc. to EN 50363-2-1
Outer Sheath Colour	grey

Electrical parameters

Rated voltage	300/500V
Max. permissible operating voltage AC	0.318/0.55 kV
Max. permissible operating voltage DC	0.413/0.825 kV
AC test voltage	2 kV

Thermal parameters

Max. permissible temperature at conductor	110 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
2x 0.75			6	7.4	22	22	60	22.5	12	0.1
2x 1	20160031		6.1	8	24	32	75	30	15	0.13
2x 1.5			7.6	9.8	29	39	115	45	18	0.2
2x 2.5			9	11.6	35	46	160	75	26	0.33
3G 0.75	20005307	5DR7646	6.2	8.1	24	32	75	33.75	12	0.1
3G 1			6.5	8.5	26	34	85	45	15	0.13
3G 1.5	20005305	5DR7644	8	10.4	31	42	135	67.5	18	0.2
3G 2.5	20005304	5DR7640	9.6	12.4	50	62	190	112.5	26	0.33
3G 4	20005310		11.3	14.5	58	73		180	34	0.53
3G 6			12.8	16.3	65	82		270	44	0.79
4G 0.75			6.8	8.8	26	35	90	45	12	0.1
4G 1			7.1	9.3	28	37	105	60	15	0.13
4G 1.5		5DR7642	9	11.6	35	46	165	90	18	0.2
4G 2.5	20005309		10.7	13.8	55	69	235	150	26	0.33
4G 4			12.7	16.2	65	81		240	34	0.53
4G 6			14.2	18.1	72	91		360	44	0.79
5G 0.75		5DR7648	7.6	9.9	30	30		56.25	12	0.1
5G 1			8	10.3	31	31		75	15	0.13
5G 1.5	20005306	5DR7645	9.8	12.7	51	64	190	112.5	18	0.2
5G 2.5	20005308	5DR7651	11.9	15.3	61	77	285	187.5	26	0.33

(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 110 °C ambient temperature, free in air, acc. to VDE 0298-4

x = without ye/gn core; G = with ye/gn core

Industry cables

MEDIUM VOLTAGE - SPECIAL RUBBER CABLES

Designation	Standard	Fire performance	Resistance to oil	Temp. fully flex. operation min.	Max. conductor temp.	Approvals	Rated voltage
NSGAFOEU 1.8/3 kV	DIN VDE 0250-602	DIN EN 60332-1-2	DIN EN 60811-404	-25°C	90°C	VDE	1.8/3 kV
NSGAFOEU 3.6/6 kV	DIN VDE 0250-602	DIN EN 60332-1-2	DIN EN 60811-404	-25°C	90°C	VDE	3.6/6 kV
NSHXAFOE 1.8/3 kV	E DIN VDE 250-606	DIN EN 60332-1-2 DIN EN 61034-2 DIN EN 60754-2	DIN EN 60811-404	-25°C	90°C		1.8/3 kV
FELTOFLEX PUR (N)3GTMC11Y	PG specification	DIN EN 60332-1-2	DIN EN 60811-404	-25°C	90°C		6/10 kV

NSGAFOEU 1,8/3 kV

Application

- For fixed installation and occasionally moving indoors and outdoors;
- In conduits for electrical wiring at, in and under plaster as well as in closed installation conduits;
- In switchgear and distribution boards up to 1000 V, also for unfused connections (DIN VDE 0100-520 and DIN VDE 0660-500);

Because of their increased mechanical strength due to the greater insulation thickness as compared with LV single-core cables, they are classified as shortcircuit-proof and earth-fault-proof. The short-circuit withstand capability, on the other hand, must be assured by specifying a conductor cross-section suitable for the short-circuit currents concerned. Please see table below for the permissible short-circuit currents.
The cables have a covering over the insulation to serve as mechanical protection during the cable installation, but are without protection against accidental contact. Therefore it has to be secured that the unscreened cables with voltages over 1000 V shall not be touched during operation.
In other respects the specifications of DIN VDE 0298-3 apply.

Global data

Type designation	NSGAFOEU
Standard	DIN VDE 0250-602

Design features

Conductor	Tinned copper, round (R), fine stranded (F), class 5 acc. to DIN EN 60228
Insulation	Vulcanized rubber compound, basis Ethylen-Propylen-Rubber (EPR), compound 3GI3 acc. to DIN EN 50363-1
Outer sheath	Vulcanized rubber compound, basis CPE, compound 5GM3 acc. to DIN EN 50363-2-1
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	1.8/3 kV
Max. permissible operating voltage AC	2.1/3.6 kV
Max. permissible operating voltage DC	2.7/5.4 kV
AC test voltage	6 kV

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
1 x 1.5	20003207	5DF2043	5.4	7	42	70	50	22.5	30	0.21
1 x 2.5	20003209	5DF2053	5.9	7.5	45	75	65	37.5	41	0.36
1 x 4	20003213	5DF2063	6.5	9	54	90	85	60	55	0.57
1 x 6	20003215	5DF2073	7.1	9.5	57	95	105	90	70	0.86
1 x 10	20003219	5DF2103	8.5	11	66	110	160	150	98	1.43
1 x 16	20003222	5DF2123	9.9	13	78	130	235	240	132	2.29
1 x 25	20003224	5DF2133	12	15	90	150	360	375	176	3.58
1 x 35	20003226	5DF2143	13.2	16.5	99	165	460	525	218	5.01
1 x 50	20003229	5DF2153	14.6	18	108	180	620	750	276	7.15
1 x 70	20003231	5DF2163	16.2	20.5	123	205	820	1050	347	10.01
1 x 95	20003233	5DF2173	19	24	144	240	1070	1425	416	13.59
1 x 120	20003235	5DF2183	20.6	26	156	260	1320	1800	488	17.16
1 x 150	20003237	5DF2203	22.7	28	168	280	1620	2250	566	21.45
1 x 185	20003239	5DF2213	24.5	31	186	310	1950	2775	644	26.46
1 x 240	20003241	5DF2223	28	34.5	207	345	2540	3600	775	34.32
1 x 300	20003244	5DF2233	30.5	38	228	380	3088	4500	898	42.9

(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, free in air. acc. to VDE 0298-4

NSGAFOEU 3,6/6 kV

Application

- For fixed installation and occasionally moving indoors and outdoors;
- In conduits for electrical wiring at, in and under plaster as well as in closed installation conduits;
- In switchgear and distribution boards up to 1000 V, also for unfused connections (DIN VDE 0100-520 and DIN VDE 0660-500);

Because of their increased mechanical strength due to the greater insulation thickness as compared with LV single-core cables, they are classified as shortcircuit-proof and earth-fault-proof. The short-circuit withstand capability, on the other hand, must be assured by specifying a conductor cross-section suitable for the short-circuit currents concerned. Please see table below for the permissible short-circuit currents.
The cables have a covering over the insulation to serve as mechanical protection during the cable installation, but are without protection against accidental contact. Therefore it has to be secured that the unscreened cables with voltages over 1000 V shall not be touched during operation.
In other respects the specifications of DIN VDE 0298-3 apply.

Global data

Type designation	NSGAFOEU
Standard	DIN VDE 0250-602

Design features

Conductor	tinned copper, round (R), fine stranded (F), class 5 acc. to DIN EN 60228
Insulation	Vulcanized rubber compound, basis Ethylen-Propylen-Rubber (EPR), compound 3GI3 acc. to DIN EN 50363-1
Outer sheath	Vulcanized rubber compound, basis CPE, compound 5GM3 acc. to DIN EN 50363-2-1
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	3.6/6 kV
Max. permissible operating voltage AC	4.2/7.2 kV
Max. permissible operating voltage DC	5.4/10.8 kV
AC test voltage	11 kV

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
1 x 1.5		5DF2065	9.5	57	95	60	22.5	31	0.21
1 x 2.5		5DF2075	10.5	63	105	85	37.5	42	0.36
1 x 4		5DF2105	12	72	120	113	60	56	0.57
1 x 6	20006429	5DF2125	13	78	130	141	90	71	0.86
1 x 10		5DF2135	14.5	87	145	191	150	99	1.43
1 x 16	20006430	5DF2145	15.5	93	155	282	240	133	2.29
1 x 25		5DF2155	17.5	105	175	391	375	174	3.58
1 x 35	20007313	5DF2165	19	114	190	500	525	215	5.01
1 x 50	20006072	5DF2175	21	126	210	650	750	270	7.15
1 x 70	20006431	5DF2185	23	138	230	860	1050	338	10.01
1 x 95	20006432	5DF2205	26.5	159	265	1110	1425	403	13.59
1 x 120	20006433	5DF2215	28.5	171	285	1390	1800	473	17.16
1 x 150	20006434	5DF2225	30.5	183	305	1690	2250	546	21.45
1 x 185	20006435	5DF2235	33	198	330	1980	2775	622	26.46

(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, free in air acc. to VDE 0298-4

NSHXAFOE 1,8/3 kV

Application

- For fixed installation and occasionally moving indoors and outdoors;
- In conduits for electrical wiring at, in and under plaster as well as in closed installation conduits;
- In switchgear and distribution boards up to 1000 V, also for unfused connections (DIN VDE 0100-520 and DIN VDE 0660-500);

Because of their increased mechanical strength due to the greater insulation thickness as compared with LV single-core cables, they are classified as shortcircuit-proof and earth-fault-proof. The short-circuit withstand capability, on the other hand, must be assured by specifying a conductor cross-section suitable for the short-circuit currents concerned. Please see table below for the permissible short-circuit currents.
The cables have a covering over the insulation to serve as mechanical protection during the cable installation, but are without protection against accidental contact. Therefore it has to be secured that the unscreened cables with voltages over 1000 V shall not be touched during operation.
In other respects the specifications of DIN VDE 0298-3 apply.

Global data

Type designation	NSHXAFOE
Standard	DIN VDE 0250-606

Design features

Conductor	bare copper, round (R), fine stranded (F), class 5 acc. to DIN EN 60228
Insulation	Ethylen-Propylen-Rubber (EPR) acc. to DIN VDE 0207 part 20: 3GI3
Outer sheath	Vulcanized rubber compound, basis Ethylen-Propylen-Rubber (EPR), compound HM3 acc. to DIN EN 50363-1
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	1.8/3 kV
Max. permissible operating voltage AC	2.1/3.6 kV
Max. permissible operating voltage DC	2.7/5.4 kV
AC test voltage	6 kV

Chemical parameters

Zero halogene	IEC 60754-2
Smoke emmission	DIN EN 61034-2
Flame propagation	DIN EN 60332-1-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²

Number of cores x cross section	Part number	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
1 x 1.5	20006648	7	42	70	60	22.5	30	0.21
1 x 2.5	20006651	7.5	45	75	70	37.5	41	0.36
1 x 4	20006654	9	54	90	90	60	55	0.57
1 x 6	20006657	9.5	57	95	120	90	70	0.86
1 x 10	20006660	11	66	110	180	150	98	1.43
1 x 16	20006663	13	78	130	250	240	132	2.29
1 x 25	20006664	15	90	150	390	375	176	3.58
1 x 35	20006665	16.5	99	165	470	525	218	5.01
1 x 50	20006666	18	108	180	625	750	276	7.15
1 x 70	20006667	20.5	123	205	880	1050	347	10.01
1 x 95	20006668	24	144	240	1190	1425	416	13.59
1 x 120	20006669	26	156	260	1430	1800	488	17.16
1 x 150	20006670	28	168	280	1750	2250	566	21.45
1 x 185	20006671	31	186	310	2160	2775	644	26.46
1 x 240	20006672	34.5	207	345	2718	3600	775	34.32
1 x 300	20006673	38	228	380	3470	4500	898	42.9

(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, on surface acc. to VDE 0298-4

FELTOFLEX PUR

(N)3GTMC11Y 6/10 kV

Application

These cables are intended for use as connection in switch-gear where very small bending radius is required.
The flexibility of the cable allows operating equipment to be moved while running.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	FELTOFLEX-PUR
Type designation	(N)3GTMC11Y
Standard	based on ANSI/NEMA WC 74, ICEA S-93-639-2012 Tested acc. to ITP (N)3GTMC11Y Based on DIN VDE 0250-813

Design features

Conductor	Tinned copper (vz), round (R), stranded (F), class 5 acc. to EN 60228
Insulation	Superclean high-voltage compound
Color code	DIN VDE 0250 P 813, natural colour
Screen over inner sheath	Spiral of tinned copper fine wires
Sheath system	Special sandwich system, flexible and robust; inner layer: soft rubber compound; outer layer: special Polyurethane Type M3
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	6/10 kV
Max. permissible operating voltage AC	6.9/12 kV
Max. permissible operating voltage DC	9/18 kV
AC test voltage	17 kV

Chemical parameters

Resistance to fire	DIN EN 61332-1-2
Resistance to oil	DIN EN 60811-404 Mobil DTE 13 M >150 days at 100°C Tribol 1710/320 >140 days at 100°C

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²

Number of cores x cross section	Part number	Diameter over insulation (nom.) mm	Outer diameter max. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Nominal operating capacitance µF/km	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
1 x 10		12.4	20.9	105	680	150	0.23	102	1.22
1 x 16		14.5	22	110	760	240	0.26	138	2.29
1 x 25		15.8	23.5	115	910	375	0.29	183	3.58
1 x 35		17.1	24.5	120	1040	525	0.32	228	5.01
1 x 50		18.7	27	130	1260	750	0.36	283	7.2
1 x 70	20114383	20.5	28.5	140	1530	1050	0.42	349	10
1 x 95		22.3	30.5	150	1770	1425	0.46	421	13.59
1 x 120		24.2	33.5	160	2180	1800	0.51	492	17.16
1 x 150	20114382	25.9	35	170	2550	2250	0.57	559	21.5
1 x 185		27.7	37	180	2900	2775	0.62	630	26.5
1 x 240		30.5	41	200	3590	3600	0.69	745	34.3

additional validity of Spec. ITP(N)3GTMC11Y
(1) The values are valid for a cable in permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, free in air acc. to VDE 0298-4

Industry cables

WIRES/BRAIDS

Designation	Insulation	Approval	Core	Temperature range
8Y13	PI/FEP	VDE/ÜG, UL	AWG	-55°C up to +200°C
8Y26	PI/FEP	VDE/ÜG, UL	AWG	-55°C up to +200°C
6Y90	FEP	UL	AWG	-190°C up to +200°C
21X	PE HFFR	IEC	metric	-25°C up to +105°C
Y671	PVC	UL, CSA	metric	-40°C up to +105°C

8Y 13
Polymid insulated wire

Application
multi-layer insulated wire intended for use in transformers which normally do not have interleaved turn or interwinding insulation. The insulation provides basic, supplementary or reinforced insulation in wound components

Global data

Type designation	8Y_13

Notes on installation

Notes on installation	Approvals: UL Style1950, File E211469 VDE ÜG acc.to EN 60950-1: 2006+A11 (VDE0805 partl1+A11):2009-11 EN 60950-1:2006+A11:2009-03 IEC 60950-1(ed2) cross section from AWG 34 ÷ 14 Wire fulfill EN 61558 Wire is acc. to UL 1446 for insulation system listed under File No. E 211469

Design features

Conductor Material	copper, silver plated (vs)
Conductor	High strength Cu-alloy, silver-coated, AWG 34 ÷ 28 Cu-wire or strand, silver-coated, AWG 27 – 11 Silver-coating :>= 1 µm Tolerance: > AWG30 +3%, -1%, < AWG30 +7,5µm, -2,5µm
Insulation	polyimide (PI)
Insulation	Polyimid-foil 25,4µm, one side with 12,7µm FEP coated, min. 67% overlap

Electrical parameters

Max. permissible operating voltage AC	0.6 kV
AC test voltage	6 kV

Thermal parameters

Ambient temperature fix installation max. (UL)	200 °C
Ambient temperature fix installation min. (UL)	-55 °C
Ambient temperature for fix installation min.	-55 °C

Number of cores x cross section	Part number	conduc-tor diameter nom. mm	Size sqmm	Outer diameter min. mm	Outer diameter max. mm	Bending radii min. mm	Net weight approx. kg/km
1 x AWG 34/1	20074126	0.16	0.02	0.4	0.5	2	0.36
1 x AWG 33/1		0.18	0.026	0.39	0.49	2	0.37
1 x AWG 32/1	20074129	0.203	0.032	0.42	0.52	2.1	0.5
1 x AWG 31/1		0.226	0.04	0.46	0.55	2.2	0.59
1 x AWG 30/1	20074343	0.254	0.051	0.45	0.55	2.2	0.75
1 x AWG 29/1	20074292	0.287	0.065	0.49	0.59	2.4	0.85
1 x AWG 28/1	20074347	0.32	0.08	0.53	0.63	2.5	1.05
1 x AWG 27/1	20074249	0.361	0.102	0.57	0.67	2.7	1.24
1 x AWG 26/1	20074346	0.404	0.128	0.6	0.7	2.8	1.5
1 x AWG 25/1	20074163	0.455	0.162	0.68	0.78	3.1	1.85
1 x AWG 24/1	20074345	0.511	0.205	0.7	0.8	3.2	2.25
1 x AWG 23/1	20074162	0.574	0.259	0.81	0.91	3.6	2.8
1 x AWG 22/1	20074354	0.643	0.332	0.87	0.97	3.9	3.5
1 x AWG 21/1	20074160	0.724	0.412	0.93	1.03	4.1	4.23
1 x AWG 20/1	20074352	0.813	0.519	1.02	1.12	4.5	5.25
1 x AWG 19/1	20074167	0.912	0.653	1.11	1.21	4.8	6.51
1 x AWG 18/1	20074351	1.03	0.823	1.22	1.32	5.3	8.1
1 x AWG 17/1	20074333	1.15	1.04	1.28	1.48	5.9	10
1 x AWG 16/1	20074154	1.29	1.31	1.42	1.62	6.5	12.5
1 x AWG 15/1	20074335	1.45	1.65	1.6	1.8	7.2	15.75
1 x AWG 14/1	20119592	1.628	2.08	1.76	1.96	7.8	19.7
1 x AWG 13/1	20074334	1.83	2.63	1.95	2.15	8.6	24.5
1 x AWG 12/1		2.05	3.3	2.2	2.35	9.4	30.8
1 x AWG 11/1		2.3	4.15	2.4	2.6	10.4	38.1

8Y 26
PI sensor cable

Application
multi-layer insulated wire intended for use in transformers which normally do not have interleaved turn or interwinding insulation. The insulation provides basic, supplementary or reinforced insulation in wound components

Global data

Type designation	8Y 26

Notes on installation

Notes on installation	Approvals: UL Style 5466, E250813 VDE ÜG acc.to EN 60950 cross section from AWG 22 ÷ 26

Design features

Conductor Material	copper, silver plated (vs)
Conductor	Cu-ETP A021, A022 acc. to. EN 13602, silver coated >= 1,02 µm in accordance to ASTM B-298
Insulation	polyimide (PI)
Insulation	1. Taping: Polyimid-foil HR616, 0,031mm thick, min. 52% overlap, UL listed 2. Taping: Polyimid-foil HR616, 0,031mm thick, min. 52% overlap, UL listed 3. Top coat FEP, coloured, layer thickness: nom 0,02mm

Electrical parameters

Maximum permissible operating voltage AC acc. to UL	1 kV
Max. permissible operating voltage AC	0.9 kV
AC test voltage	6 kV

Thermal parameters

Ambient temperature fix installation max. (UL)	200 °C
Ambient temperature fix installation min. (UL)	-55 °C
Ambient temp. in fully flex. operation min.	-55 °C
Ambient temp. in fully flex. operation max.	180 °C

Mechanical parameters

Min. bending radius	2 x D

Number of cores x cross section	Part number	Conduc-tor diameter max. mm	Size sqmm	Outer diameter min. mm	Outer diameter max. mm	Net weight approx. kg/km	Single wire diameter mm	number of single wires piece	1. Taping, number of layers	2. Taping, number of layers
1 x AWG 18/7		1.18	0.823	1.35	1.45		0.404	7	2	2
1 x AWG 20/7		0.96	0.519	1.2	1.3		0.32	7	2	2
1 x AWG 22/7	20081547	0.76	0.332	0.95	1.15	4.2	0.254	7	2	2
1 x AWG 24/7	20074185	0.61	0.205	0.8	1	2.7	0.203	7	2	2
1 x AWG 26/7	20074182	0.48	0.128	0.7	0.9	2.1	0.16	7	2	2
1 x AWG 26/19		0.51		0.87	0.97		0.102	19	2	2

6Y90 FEP AWG

Hook-up wire and stranded hook-up wires

Application

hook-up wire and stranded hook-up wire with FEP insulation for high temperature application

Design features	
Conductor	copper, tinned acc. to DIN EN 13602
Insulation	fluorinated ethylen propylene (FEP)
Insulation	FEP, type of compound 6YI1 acc. to DIN EN 50363, material is UL tested
Electrical parameters	
Max. permissible operating voltage AC	0.9 kV
AC test voltage	2.5 kV
Chemical parameters	
Flame propagation	DIN EN 60332-1-2
Thermal parameters	
Ambient temperature for fix installation min.	-190 °C
Ambient temperature for fix installation max.	200 °C
Laying temperature min.	5 °C

Number of cores x cross section	Conduc-tor diameter max. mm	Insula-tion thick-ness nom. mm	Size sqmm	Outer diameter min. mm	Outer diameter max. mm	Outer dia-meter nom. mm	Net weight approx. kg/km	Single wire diameter mm	number of single wires piece
1 x AWG 28/1	0.32	0.3	0.08	0.82	0.92	0.87	2.8	0.302	1
1 x AWG 28/7	0.38	0.3	0.089	0.88	0.98	0.93	3.5	0.127	7
1 x AWG 26/1	0.4	0.3	0.128	0.9	1	0.95	3.8	0.404	1
1 x AWG 26/7	0.48	0.3	0.141	0.98	1.08	1.03	4.1	0.16	7
1 x AWG 26/19	0.51	0.3	0.155	1.01	1.11	1.06	4.5	0.102	19
1 x AWG 24/1	0.52	0.3	0.212	1.02	1.12	1.07	5.1	0.52	1
1 x AWG 24/7	0.61	0.3	0.227	1.11	1.21	1.16	5.4	0.203	7
1 x AWG 24/19	0.64	0.3	0.241	1.14	1.24	1.19	6.1	0.127	19
1 x AWG 22/1	0.65	0.3	0.332	1.15	1.25	1.2	6.7	0.65	1
1 x AWG 22/7	0.76	0.3	0.355	1.26	1.36	1.31	7.1	0.254	7
1 x AWG 22/19	0.8	0.3	0.382	1.3	1.4	1.35	8.2	0.16	19
1 x AWG 20/1	0.82	0.3	0.528	1.32	1.42	1.37	9.3	0.82	1
1 x AWG 20/7	0.96	0.3	0.563	1.46	1.56	1.51	9.8	0.32	7
1 x AWG 20/19	1.02	0.3	0.615	1.52	1.62	1.57	11.4	0.203	19
1 x AWG 18/1	1.03	0.3	0.833	1.53	1.63	1.58	13.2	1.03	1
1 x AWG 18/7	1.21	0.3	0.897	1.71	1.81	1.76	13.7	0.404	7
1 x AWG 18/19	1.27	0.3	0.963	1.77	1.87	1.82	15.6	0.254	19
1 x AWG 16/1	1.3	0.3	1.327	1.8	1.9	1.85	17.8	1.3	1
1 x AWG 16/7	1.47	0.3	1.32	1.97	2.07	2.02	18.8	0.49	7
1 x AWG 16/19	1.5	0.3	1.343	2	2.1	2.05	24.9	0.3	19
1 x AWG 14/1	1.64	0.3	2.112	2.14	2.24	2.19	25.4	1.64	1
1 x AWG 14/7	1.99	0.3	2.155	2.49	2.59	2.54	25.7	0.38	7
1 x AWG 14/19	1.89	0.3	2.119	2.39	2.49	2.44	26.4	0.27	19
1 x AWG 12/1	2.06	0.3	3.332	2.56	2.66	2.61	38.7	2.06	1
1 x AWG 12/7	2.35	0.3	3.296	2.85	2.95	2.9	39.2	0.47	7
1 x AWG 12/19	2.38	0.3	3.359	2.88	2.98	2.93	40.6	0.34	19

21X LS0H

Application

X-PE Solid and stranded hook-up wires

Global data

Type designation	21X LS0H
Standard	IEC 60502-1:2004 IEC 60092-353

Design features

Conductor Material	Tinned copper Cu-ETP1-A017/018-P acc. to EN 13602 construction acc. to LV112 und ISO Plain Copper Cu-ETP1-A019/020-P acc. to EN 13602 construction acc. to LV112 and ISO
Conductor	Copper plain/ tinned - construction acc. to IEC 60228-5
Insulation	PE, cross linked, halogen free and flame resistant, black

Electrical parameters

Spark test	10 kV eff
Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV

Chemical parameters

Zero halogene	IEC 60754-1 IEC 60754-2
Smoke emmission	DIN EN 61034-2
Flame propagation	DIN EN 60332-3-24
Resistance to oil	IEC 60811-404

Thermal parameters

Ambient temperature for fix installation min.	-25 °C
Ambient temperature for fix installation max.	105 °C

Number of cores x cross section	Conduc-tor diameter max. mm	Insula-tion thick-ness nom. mm	Outer diameter min. mm	Outer diameter max. mm	Net weight approx. kg/km	Single wire diameter mm	number of single wires piece	Current carrying capacity (1) A
1x 0,5	1	0.4	1.9	2.1	7.8	0.2	16	10
1x 0,75	1.2	0.4	2.1	2.3	11.6	0.2	23	13
1x 1	1.28	0.57	2.6	2.8	15.1	0.2	32	16
1x 1,5	1.35	0.57	2.9	3.1	20.1	0.25	30	20
1x 2,5	1.7	0.59	3.4	3.6	30.7	0.25	49	28
1x 4	2.2	0.76	4.3	4.5	48.4	0.3	54	37
1x 6	2.75	1.01	5.4	5.6	70.6	0.3	81	48
1x 10	4.1	1.15	6.3	6.7	120	0.4	80	65
1x 16	5.2	1.2	7.6	8.2		0.4	123	86
1x 25	6.7	1.2	9	9.6		0.4	196	112
1x 35	8	1.2	10	10.8		0.4	276	137
1x 50	9.2	1.2	12	12.8		0.4	396	169

Additional colors on request

Y 671 UL1015

Application

These cables are intended for use under medium mechanical stresses in dry, damp and wet rooms and outdoors; e.g. for equipment in industrial establishments. With particular applications, the use-conditions are to be fixed in the individual case.

Global data

Type designation	Y671
Standard	UL Style 1015, UL File E250813 CSA C22.2 No.127-09, TEW

Design features

Conductor	bare copper, round (R), stranded (F) according to IEC 60228 class 5
Insulation	PVC, heat resistant, black

Electrical parameters

Max. permissible operating voltage AC	0.6/1 kV
AC test voltage	3 kV

Chemical parameters

Flame propagation	DIN EN 60332-1-2

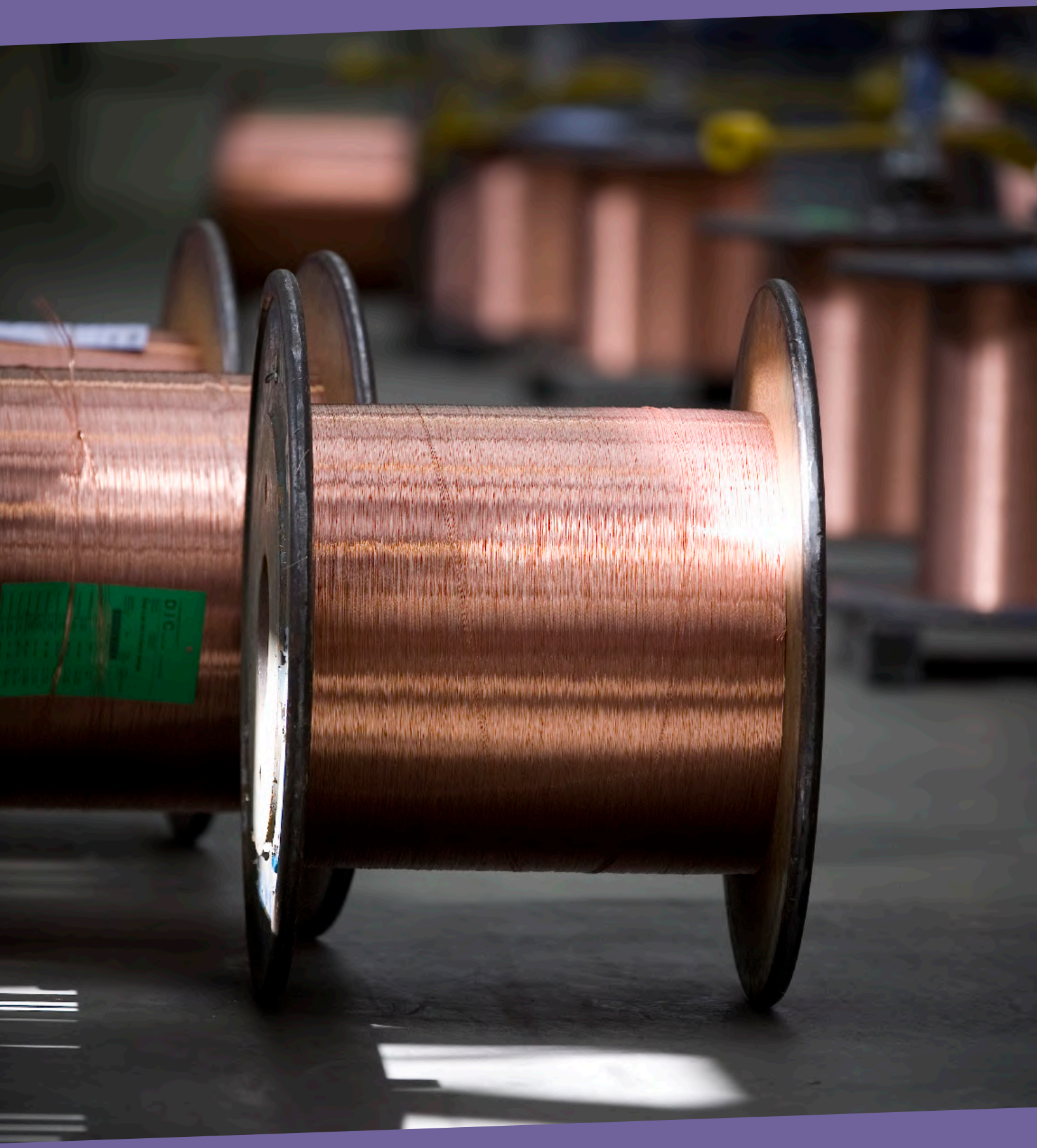
Thermal parameters

Ambient temperature fix installation min. (UL)	-40 °C
Ambient temperature fix installation max. (UL)	105 °C
Ambient temperature for fix installation min.	-40 °C
Ambient temperature for fix installation max.	105 °C
Ambient temp. in fully flex. operation min.	-25 °C

Number of cores x cross section	Part number	Conduc-tor diameter max. mm	Insula-tion thick-ness nom. mm	Size sqmm	Outer diameter min. mm	Outer diameter max. mm	Net weight approx. kg/km	Single wire diameter mm	number of single wires piece
1 x 0.5	20112189	1	0.76	0.5	2.4	2.6	9.8	0.21	16
1 x 0.75	20112188	1.2	0.76	0.75	2.6	2.8	12.8	0.21	24
1 x 1	20171761	1.35	0.76	1	2.8	3	14.8	0.21	32
1 x 1.5	20111954	1.7	0.76	1.5	3.1	3.3	20.6	0.26	30
1 x 2.5	20111953	2.2	0.76	2.5	3.55	3.85	30.5	0.26	50
1 x 4	20111955	2.75	0.76	4	4.15	4.45	46	0.31	56
1 x 6	20111956	3.3	0.76	6	5.05	5.35	68.4	0.31	84
1 x 10	20137436	4.3	1.14	10	6.4	7.2	116	0.41	80
1 x 16		5	1.53	16	8.5	9.3	181	0.41	119
1 x 25	20137439	6.7	1.53	25	9.7	10.5	265	0.41	184
1 x 35	20135174	8.2	1.53	35	11.2	12	378	0.41	266

additional color on request

Industry cables



MOTOR SUPPLY - EMC CABLES

Designation	Standard	Fire performance	Cores	Insulation	Outer sheath
2XSLCY	IEC 60502-1	IEC 60332-1-2	4 or 3+3	XLPE	PVC (ST2)
3GSEGCH	IEC 60502-2	IEC 60332-1-2 IEC 60332-3-22	3	EPR	halogen free (ST8)
3GSEGCY	IEC 60502-2	IEC 60332-1-2	3	EPR	PVC (ST2)

2XSLCY
PROTOFLEX EMC-FC 0,6/1 kV

Application
Motor Power Supply Cable especially for frequency converter controlled AC drives. For fixed installation and occasional free flexing, outdoors as well as indoors in dry, damp and wet conditions for medium mechanical stress. For areas with explosion hazard. Not suitable for installation direct in ground or in water.

Global data

Brand	PROTOFLEX EMV-FC
Type designation	2XSLCY

Design features

Conductor	Copper, plain, finely stranded, class 5 acc. to IEC 60228 protective earth conductor: for cross section >10mm² the protective earth conductor is devided into three cores and layed in interstice.
Insulation	Cross-linked polyethylene (XLPE) compound according to IEC 60502-1
Color code	green-yellow, brown, black grey acc. to VDE 0293-308
Screen	Multi-layer screen -aluminium-coated foil -braid of tinned copper wires
Outer sheath	PVC compound ST2, acc. to IEC 60502-1, color: orange transparent

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC test voltage	5 kV
Peak voltage	2400 V
EMC	EMC-optimized cable design. The maximum permissible values of Radio frequency interference (RFI) and RFI-voltage are in accordiance with DIN EN 55011/DIN 0875 part 11, classes A1 and B1.
Transfer impedance	<= 30 Ohm/km
Frequency converter with U max.	690 V
Current Carrying Capacity description	(1) The definitions in DIN VDE 0298 part 4 apply. The current-carrying capacity values in the table "ordering data" are valid for one cable, touching surface at ambient temperature 40°C.

Chemical parameters

Flame propagation	DIN EN 60332-1-2
UV-resistance	UL1581 clause 1200
Ozone resistance	DIN EN 60811-403

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C (max. 5 s)
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-5 °C

Mechanical parameters

Max. tensile load on the conductor	moved 15 N/mm² fixed installation 50 N/mm²

Number of cores x cross section	Part number	MLFB Number	Diameter over screen (nom.) mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Nominal operating capacitance µF/km	Current carrying capacity (1) A
4 x 1,5	20003151	5DE6600	8.4	11.5	69	92	150	300	0.13	21
4 x 2,5	20003152	5DE6601	9.4	13	100	125	205	500	0.145	27
4 x 4	20003153	5DE6602	11.6	15.5	124	155	320	800	0.145	37
4 x 6	20003154	5DE6603	12.8	17	136	170	410	1200	0.16	48
4 x 10	20003155	5DE6604	15.3	19.5	156	195	600	2000	0.185	67
3 x 16 + 3x2,5	20003156	5DE6605	16.2	21	168	210	770	2400	0.235	90
3 x 25 + 3x4	20003157	5DE6606	19.8	24.5	196	245	1110	3750	0.245	119
3 x 35 + 3x16/3	20003158	5DE6607	22.5	28	224	280	1510	5250	0.27	147
3 x 50 + 3x25/3	20003159	5DE6608	26.7	33	264	330	2140	7500	0.27	184
3 x 70 + 3x35/3	20003160	5DE6610	30.6	37	296	370	2860	10500	0.295	228
3 x 95 + 3x50/3	20003161	5DE6611	35.1	42	336	420	3740	14250	0.3	274
3 x 120 + 3x70/3	20003162	5DE6612	39.6	46.5	372	465	4810	18000	0.315	320
3 x 150 + 3x70/3	20003163	5DE6613	44.3	51.5	412	515	5850	22500	0.315	368
3 x 185 + 3x95/3	20003164	5DE6614	48.9	57	456	570	7100	27750	0.315	420
3 x 240 + 3x120/3	20003165	5DE6615	55.8	64.5	516	645	9400	36000	0.32	498
3 x 300 + 3x150/3	20025102	5DE6616	62.9	72	576	720	11680	45000	0.33	576

3GSEGCH

MS-SIENOPYR EMC-FC

Application

Medium Voltage Motor Power Supply Cable, Halogen free, for frequency converter controlled AC drives. For fixed installation outdoors as well as indoors in dry, damp and wet conditions and in explosion hazard areas. The cable is not suitable for the installation direct in ground or in water.

Global data

Standard	IEC 60502-2

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 (class 5 on request)
Insulation	Ethylene-propylene-rubber EPR acc. to IEC 60502-2
Electrical field control	Inner and outer layer of semiconductive rubber compound
Color code	Numerical 1-2-3 imprint on the outer semiconductive layer
Individual screen	Two copper tapes wrapped. The rated cross section of the core screening is the sum of the cross-sections of all individual conductor screens. 35 ... 120mm² = 16mm² >120 mm² = 25mm²
Inner covering	Polyolefin compound, black, according to IEC 60502-2
Screen	Layer of plain copper wires and transverse helical copper tape, screen cross section: approx. 0,5 conductor cross-section (electrical)
Outer sheath	Polyolefin compound, type ST8, according to IEC 60502-1 flame retardant - low smoke - halogen free
Outer Sheath Colour	Red

Electrical parameters

Rated voltage	Three-phase AC operation at 50Hz: - Uo/U: 6/10 kV - Umax: 12 kV FC-operation: - Uo/U: 3,6/6 kV - Umax: 7,2 kV FC-operation (for a link voltage of max. 6.8 kV) incl. harmonics: - U: 4,16 kV (fundamental) - Û: max 15 kV
EMC	EMC-optimized cable design. The maximum permissible values of Radio frequency interference (RFI) and RFI-voltage are in accordiance with DIN EN 55011/DIN 0875 part 11, classes A1 and B1.
Current Carrying Capacity description	(1) The values in the table "ordering data" are valid for one cable, touching surfaces at 40°C ambient temperature acc. to VDE 0298 part 4

Chemical parameters

Smoke emmission	IEC 61034
Toxicity of smoke	IEC 60754-2
Flame propagation	IEC 60332-3-22 IEC 60332-1-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-30 °C
Laying temperature min.	-10 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm²

Number of cores x cross section	Part number	MLFB Number	Diameter over screen (nom.) mm	Outer diameter max. mm	Bending radius fixed min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A
3 x 35		5DW3811	41	45.5	364	3500	5250	154
3 x 50		5DW3812	43.5	48	384	4200	7500	185
3 x 70		5DW3813	47.5	52.5	420	5200	10500	230
3 x 95		5DW3814	51.5	56.5	452	6400	14250	279
3 x 120	20005391	5DW3815	54.5	60	480	7600	18000	321
3 x 150	20005392	5DW3816	58	64	512	8700	22500	364
3 x 185	20024438	5DW3817	62.5	68	544	10500	27750	417
3 x 240		5DW3818	67.5	73.5	588	13000	36000	491
3 x 300		5DW3819	72.7	78.1	594	15400	45000	569

3GSEGCY

MS-PROTOFLEX EMC-FC

Application

Medium Voltage Motor supply cables for frequency converter controlled AC drives. For fixed installation outdoors as well as indoors in dry, damp and wet conditions and in explosion hazard areas.
The cable can be installed directly in ground. The cable is not suitable for continuous use in water.

Global data

Standard	IEC 60502-2

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 (class 5 on request)
Insulation	Ethylene-propylene-rubber (EPR) acc. to IEC 60502-2
Electrical field control	Inner and outer layer of semiconductive rubber compound
Color code	Numerical 1-2-3 imprint on the outer semiconductive layer
Individual screen	Two copper tapes wrapped. The rated cross-section of the core screening is the sum of the cross-sections of all individual conductor screens. 35 ... 120mm² = 16mm² >120 mm² = 25mm²
Inner covering	Polyolefin compound, black, according to IEC 60502-2
Screen	Layer of plain copper wires and transverse helical copper tape, screen cross section: approx. 0,5 conductor cross-section (electrical)
Outer sheath	PVC-compound, type ST2, according to IEC 60502-2
Outer Sheath Colour	Red

Electrical parameters

Rated voltage	Three-phase AC operation at 50Hz: - Uo/U: 6/10 kV - Umax: 12 kV FC-operation: - Uo/U: 3,6/6 kV - Umax: 7,2 kV FC-operation (for a link voltage of max. 6.8 kV) incl. harmonics: - U: 4,16 kV (fundamental) - Û: max 15 kV
EMC	EMC-optimized cable design. The maximum permissible values of Radio frequency interference (RFI) and RFI-voltage are in accordiance with DIN EN 55011/DIN 0875 part 11, classes A1 and B1.
Current Carrying Capacity description	(1) The values in the table "ordering data" are valid for one cable, touching surfaces at 40°C ambient temperature. Load capacity when installed in ground acc. to DIN VDE 0276-620 6C or on request.

Chemical parameters

Flame propagation	IEC 60332-1-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-30 °C
Laying temperature min.	-10 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm²

Number of cores x cross section	Part number	MLFB Number	Diameter over screen (nom.) mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
3 x 35		5DW3821	41	45.5	364	683	3500	5250	154	5.57
3 x 50	20094183	5DW3822	43.5	48	384	720	4200	7500	185	7.95
3 x 70	20037061	5DW3823	47.5	52.5	420	788	5200	10500	230	11.13
3 x 95	20005393	5DW3824	51.5	56.5	452	484	6400	14250	279	15.11
3 x 120	20025948	5DW3825	54.5	60	480	900	7600	18000	321	19.08
3 x 150	20006990	5DW3826	58	64	512	960	8700	22500	364	23.85
3 x 185	20005394	5DW3827	62.5	68	544	1020	10500	27750	417	29.42
3 x 240	20005395	5DW3828	67.5	73.5	588	1103	13000	36000	491	38.16
3 x 300		5DW3829	72.7	78.1	594	1172	15400	45000	569	47.7

Industry cables

WATER -
CABLES FOR WASTE WATER

Designation	Standard	Fire performance	Resistance to oil	Approvals
OZOFLEX (PLUS) H07RN8-F	DIN EN 50525-2-21	DIN EN 60332-1-2	DIN EN 60811-404	VDE
TECWATER S1BN8-F	Based on DIN EN 50525-2-21	DIN EN 60332-1-2	DIN EN 60811-404	VDE
TECWATER EMC-FC S1BC4N8-F	Based on DIN EN 50525-2-21	DIN EN 60332-1-2	DIN EN 60811-404	VDE
PROTOMONT NSSHOEU	DIN VDE 0250-812	DIN EN 60332-1-2	DIN EN 60811-404	VDE Gost K, Gost B MSHA P-189-3
MS-TECWATER (N)TSWOEU	Based on DIN VDE 0250-813	DIN EN 60332-1-2	DIN EN 60811-404	

OZOFLEX(PLUS)

H07RN8-F

Application

OZOFLEX(PLUS) rubber-sheathed cables H07RN8-F are intended for connection of electrical equipment in contaminated water and for medium mechanical stresses. Due to the various substances in the contaminated water, the cables may be used only in easily accessible areas that can be inspected (installation depth of approx. 10 m, as normally used in sewage water tanks). These cables are also suitable for use in process water, cooling water, mine surface water, rainwater and combined waste water. They further can be used in groundwater and seawater; less stringent specifications in terms of accessibility and inspection can be imposed (in such cases the cables can be used at depths up to 2000 m). Water types are defined in accordance with DIN 4045 and DIN 4046. If the water concerned is aggressive or composed of special substances, the cable's resistance properties should be examined.
These cables can be used indoors, outdoors, in explosion-hazard areas to DIN VDE 0165, in fire-hazard locations, on construction sites in accordance with DIN VDE 0100 Part 704, in open-cast mining and in quarries in accordance with DIN VDE 0168, in industry and in agriculture. They can also be permanently installed, e.g. on plaster, on excavators or on hoisting gear. If they are permanently installed in protective conduits or equipment, or e.g. in well installations or are used as rotor circuit cables for motors, the cables may be operated with an AC voltage of up to 1000 V or a DC voltage to earth of up to 750 V.
Permissible AC test voltage in connection with motor tests is 3 kV, max. test duration of 3 minutes. The insulating and sheath materials used allow a max. conductor temperature of 90 °C. Thanks to this characteristic, which is verified by a report from the VDE Test and Certification Institute, cables may be used according to the specifications of Federal Testing Laboratories (PTB) for explosion-protected pumps. In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	OZOFLEX(PLUS)
Type designation	H07RN8-F
Standard	EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Copper, finely stranded, class 5 in accordance with DIN EN 60228 / IEC 60228; tinned up to and including 6 mm²
Insulation	Vulcanized rubber compound, basis EPR, compound EI7 in accordance with DIN EN 50363-1
Color code	up to 5 cores: colored in accordance with DIN VDE 0293-308 from 6 cores: acc. to EN 50525-1 Annex D
Inner sheath	for multicore cables with wall thickness of sheath > 2,4 mm and control cables: vulcanized rubber compound, basis EPR, compound EM6 in accordance with DIN EN 50363-2-1 Colour of sheath: light
Outer sheath	Vulcanized rubber compound, basis CPE, compound EM7 in accordance with DIN EN 50363-2-1
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	450/750V
Max. permissible operating voltage AC	0.476/0.825 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC Test Voltage	2.5 kV (15 Min.)

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	40 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
1x1,5	20008093	5DH1001	5.6	6.4	19	19	49	23	33	40	0.21
1x2,5		5DH1002	6.3	7	21	21	50	38	43	52	0.36
1x4	20003613	5DH1003	7.3	8.1	24	32	92	60	59	70	0.57
1x6	20148843	5DH1004	7.9	8.7	26	35	115	90	76	91	0.86
1x10	20148844	5DH1005	9.8	11	33	44	186	150	106	127	1.43
1x16	20148845	5DH1006	10.6	11.8	35	47	257	240	142	170	2.29
1x25	20064587	5DH1007	12.9	14.1	56	71	371	375	188	225	3.58
1x35	20003614	5DH1008	14.3	15.5	62	78	476	525	232	278	5.01
1x50	20003615	5DH1010	16.5	18	72	90	667	750	289	347	7.15
1x70	20003616	5DH1011	18.6	20.1	80	101	879	1050	358	429	10.01
1x95	20003617	5DH1012	21.9	23.4	94	117	1180	1425	431	517	13.59
1x120	20003618	5DH1013	23.4	24.9	100	125	1423	1800	504	605	17.16
1x150	20003688	5DH1260	26.3	28.5	114	143	1804	2250	578	694	21.45
1x185	20003683	5DH1252	28.5	30.7	123	154	2175	2775	660	792	26.46
1x240	20003687	5DH1258	31.8	34	136	170	2804	3600	783	940	34.32
1x300	20003684	5DH1253	35.1	37.3	149	187	3407	4500	906	1087	42.9
2x1	20156716	5DH1238	7.7	8.7	26	35	94	30	19	23	0.14
2x1,5	20041045	5DH1074	8.6	9.6	29	38	116	45	24	29	0.21
2x2,5	20163164	5DH1075	10	11.6	35	46	169	75	32	38	0.36
2x4	20163165	5DH1076	11.9	13.5	54	68	239	120	43	52	0.57
2x6	20163811	5DH1077	13.5	15.1	60	76	314	180	56	67	0.86
3G1	20003620	5DH1014	8.2	9.2	28	37	107	45	19	23	0.14
3G1,5	20003621	5DH1015	9.4	10.4	31	42	142	68	24	29	0.21
3G2,5	20007343	5DH1016	10.9	12.5	50	63	207	113	32	38	0.36
3G4		5DH1017	12.8	14.4	58	72	289	180	43	52	0.57
3G6		5DH1018	14.4	16.4	66	82	384	270	56	67	0.86
3G10	20172908	5DH1020	19.9	21.9	88	110	712	450	78	93	1.43
3x1,5		5DH1045	9.4	10.4	31	42	142	68	24	29	0.21
3x2,5		5DH1046	10.9	12.5	50	63	207	113	32	38	0.36
3x4		5DH1047	12.8	14.4	58	72	289	180	43	52	0.57
3x6		5DH1048	14.4	16.4	66	82	384	270	56	67	0.86
3x10	20113319	5DH1050	19.9	21.9	88	110	690	450	78	93	1.43
3x16	20113320	5DH1051	23.5	25.5	102	128	994	720	104	125	2.29
3x25	20114481	5DH1052	26.8	29.8	119	149	1373	1125	138	165	3.58
3x35	20016655	5DH1053	30.3	33.3	133	167	1840	1575	171	205	5.01
3x50	20003634	5DH1054	34.4	37.4	150	187	2412	2250	213	255	7.15
3x70	20003635	5DH1055	39.1	42.1	168	211	3322	3150	263	316	10.01
3x95	20151270	5DH1056	44.7	47.7	191	239	4150	4275	317	380	13.59
3x120	20041913	5DH1057	47	51	204	255	5200	5400	371	445	17.16
4G1	20003681	5DH1245	9.3	10.3	31	41	139	60	19	23	0.14
4G1,5	20003622	5DH1021	10.2	11.8	35	47	177	90	24	29	0.21
4G2,5	20003623	5DH1022	12	13.6	54	68	251	150	32	38	0.36
4G4	20003624	5DH1023	13.8	15.4	62	77	344	240	43	52	0.57
4G6	20003625	5DH1024	16.1	18.1	72	91	481	360	56	67	0.86
4G10	20003626	5DH1025	21.2	23.2	93	116	841	600	78	93	1.43
4G16	20003627	5DH1026	25.3	28.3	113	142	1256	960	104	125	2.29
4G25	20003628	5DH1027	29.9	32.9	132	165	1812	1500	138	165	3.58
4G35	20003629	5DH1028	33.7	36.7	147	184	2312	2100	171	205	5.01

x = without ye/gn core; G = with ye/gn core

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
4G50	20003630	5DH1030	38.6	41.6	166	208	3011	3000	213	255	7.15
4G70	20003631	5DH1031	43.7	46.7	187	234	4230	4200	263	316	10.01
4G95	20003632	5DH1032	50.3	54.3	217	272	5536	5700	317	380	13.59
4G120	20003633	5DH1033	54.6	58.6	234	293	6724	7200	371	445	17.16
5G1	20172298	5DH1247	10.1	11.7	35	47	168	75	19	23	0.14
5G1,5	20003682	5DH1246	11.1	12.7	51	64	210	113	24	29	0.21
5G2,5	20007386	5DH1250	13.3	14.9	60	75	303	188	32	38	0.36
5G4	20156864	5DH1061	15.6	17.6	70	88	437	300	43	52	0.57
5G6	20065655	5DH1062	16.6	18.6	74	93	550	450	56	67	0.86
5G10		5DH1063	23.6	26.6	106	133	1036	750	78	93	1.43
5G16	20182416	5DH1064	28.3	31.3	125	157	1524	1200	104	125	2.29
6G1,5	20003671	5DH1224	13.6	15.2	61	76	297	135	24	29	0.21
7G1,5	20003678	5DH1082	15.2	17.2	69	86	362	158	24	29	0.21
8G1,5	20188803	5DH1083	17.5	19.5	78	98	452	180	24	29	0.21
10G1,5	20003680	5DH1084	18	20	80	100	477	225	24	29	0.21
11G1,5		5DH1255	18.1	20.1	80	101	490	248	24	29	0.21
12G1,5	20003668	5DH1221	17.2	19.2	77	96	480	270	24	29	0.21
7G2,5	20003672	5DH1227	17.5	19.5	78	98	500	263	32	38	0.36
8G2,5	20014373	5DH1228	18.7	20.7	83	104	563	300	32	38	0.36
10G2,5	20003675	5DH1234	21	22.8	91	114	647	375	32	38	0.36
12G2,5	20003669	5DH1222	21.1	23.1	92	116	708	450	32	38	0.36

Current carrying capacity in water: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient water temperature, two or three cores loaded, multi-core cables all cores loaded (cable compete immersed in water).
(2) Current carrying capacity free in air: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, two or three cores loaded, multi-core cables all cores loaded (see also DIN VDE 298-4).

x = without ye/gn core; G = with ye/gn core

NOTES

TECWATER
S1BN8-F 0.6/1kV

Application
TECWATER rubber-sheathed cables S1BN8-F are intended for connection of electrical equipment in contaminated water and for medium mechanical stresses. Due to the various substances in the contaminated water, the cables may be used only in easily accessible areas that can be inspected (installation depth of approx. 10 m, as normally used in sewage water tanks). These cables are also suitable for use in process water, cooling water, mine surface water, rainwater and combined waste water. They further can be used in groundwater and seawater; less stringent specifications in terms of accessibility and inspection can be imposed (in such cases the cables can be used at depths up to 2000 m). Water types are defined in accordance with DIN 4045 and DIN 4046.
If the water concerned is aggressive or composed of special substances, the cable's resistance properties should be examined. These cables can be used indoors, outdoors, in explosion-hazard areas to DIN VDE 0165, in fire-hazard locations, on construction sites in accordance with DIN VDE 0100 Part 704, in open-cast mining and in quarries in accordance with DIN VDE 0168, in industry and in agriculture. They can also be permanently installed, e.g. on plaster, on excavators or on hoisting gear.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	TECWATER
Type designation	S1BN8-F
Standard	Based on EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Plain copper, finely stranded class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Ozone, water and weather resistant insulation compound, base EPR (Ethylene-Propylene Rubber)
Color code	up to 5 cores: colored in accordance with DIN VDE 0293-308 from 6 cores: more than 5 cores: Cores light, printed with black numbers 4G4+2X0,75: green-yellow, brown, black, grey; control cores light with black numbers; 7G..+5X1,5: green-yellow, other cores black with white numbers; control cores light with black numbers;
Inner sheath	For all multi core cables with cross-section more than 6mm² and all cables with more than 5 cores: Inner layer of CPE special compound; color: blue
Outer sheath	Special rubber compound based on CPE, water and oil-resistant
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC Test Voltage	3.5 kV (5 Min.)

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	40 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
1X1,5		5DH8302	5.8	6.6	20	20	53	23	33	40	0.21
1X2,5		5DH8303	6.3	7	21	21	65	38	43	52	0.36
1X4		5DH8304	6.7	7.5	23	23	82	60	59	70	0.57
1X6		5DH8305	7.2	8	24	24	103	90	76	91	0.86
1X10		5DH8306	8.3	9.1	27	36	160	150	106	127	1.43
1X16		5DH8307	9.1	10.1	30	40	210	240	142	170	2.29
1X25		5DH8308	10.8	12.4	50	62	315	375	188	225	3.58
1X35		5DH8309	12.3	13.9	56	70	421	525	232	278	5.01
1X50	20026648	5DH8310	14.1	15.7	63	79	577	750	289	347	7.15
1X70		5DH8311	16.3	18.3	73	92	808	1050	358	429	10.01
1X95	20014613	5DH8312	18.8	20.3	81	102	1024	1425	431	517	13.59
1X120		5DH8313	20.9	22.9	92	115	1314	1800	504	605	17.16
1X150	20036145	5DH8314	23.2	25.2	101	126	1627	2250	578	694	21.45
1X185	20026006	5DH8315	26	28.3	113	142	1982	2775	660	792	26.46
1X240		5DH8316	28.9	31.2	125	156	2548	3600	783	940	34.32
1X300	20035987	5DH8317	32.1	34.4	138	172	3151	4500	906	1087	42.9
1X400		5DH8318	36.3	38.6	154	193	4087	6000	1045	1254	57.2
1X500		5DH8319	40.4	42.7	171	214	5160	7500	1203	1443	71.5
2X1		5DH8321	8	9	27	36	94	30	19	23	0.14
2X1,5		5DH8322	8.6	9.6	29	38	111	45	24	29	0.21
2X2,5		5DH8323	9.4	10.4	31	42	141	75	32	38	0.36
2X4		5DH8324	10.2	11.8	35	47	182	120	43	52	0.57
2X6		5DH8325	11.2	12.8	51	64	239	180	56	67	0.86
2X10		5DH8326	15	17	68	85	420	300	78	93	1.43
2X16		5DH8327	17.6	19.6	78	98	597	480	104	125	2.29
2X25		5DH8328	21.6	23.6	94	118	890	750	138	165	3.58
3G1		5DH8331	8.4	9.5	29	38	104	45	19	23	0.14
3G1,5	20026138	5DH8332	9.1	10.1	30	40	125	68	24	29	0.21
3G2,5		5DH8333	9.6	11.2	34	45	162	113	32	38	0.36
3G4		5DH8334	10.6	12.2	49	61	216	180	43	52	0.57
3X1		5DH8381	8.4	9.5	29	38	104	45	19	23	0.14
3X1,5		5DH8382	9.1	10.1	30	40	125	68	24	29	0.21
3X2,5		5DH8383	9.6	11.2	34	45	162	113	32	38	0.36
3X4		5DH8384	10.6	12.2	49	61	216	180	43	52	0.57
3X6	20066348	5DH8385	12.1	13.7	55	69	292	270	56	67	0.86
3X10		5DH8386	16.3	18.3	73	92	514	450	78	93	1.43
3X16		5DH8387	19.1	21.1	84	106	740	720	104	125	2.29
3X25		5DH8388	23.1	25.1	100	126	1094	1125	138	165	3.58
3X35		5DH8389	25.6	28.6	114	143	1459	1575	171	205	5.01
3X50		5DH8390	29.9	32.9	132	165	2018	2250	213	255	7.15
3X70		5DH8391	35.4	38.4	154	192	2808	3150	263	316	10.01
3X95		5DH8392	39	42	168	210	3547	4275	317	380	13.59
3X120		5DH8393	44.4	47.4	190	237	4542	5400	371	445	17.16
3X150		5DH8394	49	53	212	265	5627	6750	425	510	21.45
3X185		5DH8395	54.2	58.2	233	291	6819	8325	485	582	26.46
3X240		5DH8396	61.4	65.4	262	327	8645	10800	576	691	34.32
4G1	20036387	5DH8351	9.1	10.1	30	40	123	60	19	23	0.14
4G1,5	20026055	5DH8352	9.5	11.1	33	44	148	90	24	29	0.21

x = without ye/gn core; G = with ye/gn core

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
4G2,5	20026139	5DH8353	10.5	12.1	48	61	201	150	32	38	0.36
4G4	20026048	5DH8354	11.8	13.4	54	67	276	240	43	52	0.57
4G6	20026128	5DH8355	13.6	15.2	61	76	378	360	56	67	0.86
4G10	20025842	5DH8356	17.8	19.8	79	99	464	600	78	93	1.43
4G16	20026004	5DH8357	20.9	22.9	92	115	934	960	104	125	2.29
4G25	20026081	5DH8358	25.3	28.3	113	142	1418	1500	138	165	3.58
4G35	20036142	5DH8359	28.3	31.3	125	157	1877	2100	171	205	5.01
4G50	20026158	5DH8360	33.2	36.2	145	181	2613	3000	213	255	7.15
4G70	20025843	5DH8361	38.7	41.7	167	209	3638	4200	263	316	10.01
4G95	20026007	5DH8362	43.7	47.7	191	239	4643	5700	317	380	13.59
4G120	20036143	5DH8363	48.7	52.7	211	264	5833	7200	371	445	17.16
4G150	20016293	5DH8364	54.5	58.5	234	293	7222	9000	425	510	21.45
4G185		5DH8365	60.6	64.6	258	323	8830	11100	485	582	26.46
4G240		5DH8366	68.2	72.2	289	361	11457	14400	576	691	34.32
4G300		5DH8367	77	81	324	405	14368	18000	666	800	42.9
5G1,5	20068720	5DH8372	10.4	12	36	48	186	113	24	29	0.21
5G2,5		5DH8373	11.6	13.2	53	66	250	188	32	38	0.36
5G4		5DH8374	12	13.6	54	68	340	300	43	52	0.57
5G6		5DH8375	14.6	15.3	61	77	480	450	56	67	0.86
5G10		5DH8376	19.9	21.9	88	110	810	750	78	93	1.43
5G16		5DH8377	23.2	25.2	101	126	1192	1200	104	125	2.29
5G25		5DH8378	28	31	124	155	1810	1875	138	165	3.58
5G70			42.5	46.5	186	233	4500	5250	263	316	10.01
7G1,5	20026053	5DH8403	12.9	14.5	58	73	276	158	24	29	0.21
8G1,5	20026049	5DH8404	14.5	16.5	66	83	305	180	24	29	0.21
10G1,5	20026054	5DH8406	15.6	17.6	70	88	376	225	24	29	0.21
11G1,5	20026207	5DH8407	16	18	72	90	400	248	24	29	0.21
12G1,5	20026051	5DH8408	16	18	72	90	413	270	24	29	0.21
7G2,5	20036709	5DH8413	14.7	16.7	67	84	381	263	32	38	0.36
8G2,5		5DH8414	16.3	18.3	73	92	410	300	32	38	0.36
10G2,5	20025847	5DH8416	17.4	19.4	78	97	480	375	32	38	0.36
12G2,5	20102524	5DH8418	17.9	19.9	80	100	555	450	32	38	0.36
4G4+2X0,75ST	20026080	5DH8103	15.3	17.3	69	104	386	240	43	52	0.57
7G4+5X1,5ST	20039852	5DH8120	21.2	22.8	91	137	698	420	43	52	0.57
7G6+5X1,5ST	20039853	5DH8121	24.5	26.1	104	157	909	630	56	67	0.86
7G10+5X1,5ST	20039854	5DH8122	25.3	26.8	107	161	1174	1050	78	93	1.43

Current carrying capacity in water: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient water temperature, two or three cores loaded, multi-core cables all cores loaded (cable compete immersed in water).
(2) Current carrying capacity free in air: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, two or three cores loaded, multi-core cables all cores loaded (see also DIN VDE 298-4).

x = without ye/gn core; G = with ye/gn core

NOTES

TECWATER EMC-FC
S1BC4N8-F

Application
TECWATER EMV-FC rubber-sheathed cables S1BC4N8-F are intended for connection of electrical equipment in contaminated water and for medium mechanical stresses, e.g. submersible pumps in sewage disposal and treatment as well as submersible mixer. Especially for frequency converter controlled AC drives and if considerable demands in respect of electromagnetic compatibility (EMC) according to the EMC directive imposes. For an effective shielding both ends of cable must have a good shield contact to ground. Due to the various substances in the contaminated water, the cables may be used only in easily accessible areas that can be inspected (installation depth of approx. 10 m, as normally used in sewage water tanks). These cables are also suitable for use in process water, cooling water, mine surface water, rainwater and combined waste water. They further can be used in groundwater and seawater; less stringent specifications in terms of accessibility and inspection can be imposed (in such cases the cables can be used at depths up to 2000 m). Water types are defined in accordance with DIN 4045 and DIN 4046.
If the water concerned is aggressive or composed of special substances, the cable's resistance properties should be examined. These cables can be used indoors, outdoors, in explosion-hazard areas to DIN VDE 0165, in fire-hazard locations, on construction sites in accordance with DIN VDE 0100 Part 704, in open-cast mining and in quarries in accordance with DIN VDE 0168, in industry and in agriculture. They can also be permanently installed, e.g. on plaster, on excavators or on hoisting gear.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	TECWATER
Type designation	S1BC4N8-F
Standard	Based on EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Plain copper, finely stranded class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Ozone, water and weather resistant insulation compound, base EPR (Ethylene-Propylene Rubber)
Color code	colored in accordance with DIN VDE 0293-308
Inner sheath	For all multi core cables with cross-section more than 6mm²: Inner layer of CPE special compound; color: blue
Screen over inner sheath	Braid of tinned copper wires Maximum transfer impedance 30Ω/km at 30MHz
Outer sheath	Special rubber compound based on CPE, water and oil-resistant
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC Test Voltage	5 kV (5 Min.)
Peak voltage	2400 V

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	40 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
3X1,5/1,5KON		5DH8702	9.5	11.1	33	44	174	67	24	29	0.21
3X2,5/2,5KON		5DH8703	10.5	12.1	48	61	230	112	32	38	0.36
3X4/4KON		5DH8704	11.8	13.4	54	67	310	180	43	52	0.57
3X6/6KON	20025844	5DH8705	13.6	15.2	61	76	389	270	56	67	0.86
3X10/10KON	20026052	5DH8706	17.8	19.8	79	99	693	450	78	93	1.43
3X16/16KON	20025845	5DH8707	20.9	22.9	92	115	1037	720	104	125	2.29
3X25+3G16/3	20025846	5DH8708	25.3	28.3	113	142	1477	1125	138	165	3.58
3X35+3G16/3	20026360	5DH8709	28.3	31.3	125	157	1883	1575	171	205	5.01
3X50+3G25/3	20036144	5DH8710	33.2	36.2	145	181	2635	2250	213	255	7.15
3X70+3G35/3	20026361	5DH8711	38.7	41.7	167	209	3633	3150	263	316	10.01
3X95+3G50/3	20066958	5DH8712	43.7	47.7	191	239	4652	4275	317	380	13.59
3X120+3G70/3	20058130	5DH8713	48.8	51.8	207	259	5933	5400	371	445	17.16

(2) Nominal current carrying capacity for multicore cable or three single-core cables in trefoil in permanent operation with DC or AC with 50 up to 60 Hz at 30°C ambient temperature, free in air, three cores loaded. (see also VDE 0298-4)
Current carrying capacity in water: The values are valid for a multicore cable or three single-core cables in trefoil in permanent operation with DC or AC with 50 up to 60 Hz at 30°C ambient water temperature, three cores loaded.

PROTOMONT NSSHOEU 1kV

Flexible Rubber Cables

Application

For flexible use and fixed installation open-cast mining applications, in quarries, on construction sites and similar applications, with heavy mechanical stresses. The cables can be used indoors as well as outdoors, in explosion-hazard areas, in industry and in agriculture. They can be used permanently in waste water up to 40°C at a depth of max. 2000 m and in industrial water, cooling water, surface water, rainwater and mixed water - and in groundwater and seawater to a more limited extent. The requirements for accessibility and inspection depend on the consistency of the water.In aggressive water or composed of special substances, the cable's resistance properties should be tested. In other respects the specifications of DIN VDE 0298 part 3 applies.

Global data

Brand	PROTOMONT
Type designation	NSSHOEU
Standard	DIN VDE 0250-812
Certifications / Approvals	MA – China MSHA P-189-3 Fire Certificate of Russian Federation TR-Certificate GOST K GOST B

Notes on installation

Notes on installation	Maximum submersing depth 2000 meters

Design features

Conductor	Copper, tinned, finely stranded (class 5) in accordance with DIN EN 60228 / IEC 60228
Insulation	PROTOLON, Basic material: EPR, Compound type: 3GI3 in accordance with DIN EN 50363
Core identification	Up to 5 cores: colored in gray, black, brown, blue, green/yellow from 6 cores: light gray with black digits
Core arrangement	Three main conductors laid-up together with the protective-earth conductor, from 50 mm² with protective-earth conductor split into three in the outer interstices
Inner sheath	Vulcanized rubber compound, Basic material: EPR, Compound type: GM1B in accordance with DIN EN 50363 (not for single-core cables)
Outer sheath	Vulcanized rubber compound, synthetic elastomer compound e.g. CPE, Compound: 5GM5 in accordance with DIN EN 50363, Color: Yellow

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC test voltage	3 kV
Duration of AC test voltage	5 min.

Chemical parameters

Resistance to fire	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404
Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone and moisture
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	40 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C
Ambient temp. in fully flex. operation max.	60 °C

Mechanical parameters

Max. tensile load of cable	15 N/mm²
Torsional stress	100 °/m
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Net weight approx. kg/km	Permis-sible tensile force max. N	Nominal operating capacitance µF/km	Induc-tance nom. mH/ km	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
PROTOMONT NSSHÖU-O 1x...										
1x16	20004811	5DL1112	10.6	11.6	235	240	0.42	0.26	103	2.29
1x25	20008654	5DL1113	12.8	13.7	355	375	0.42	0.26	137	3.58
1x35	20004812	5DL1114	13.9	14.8	450	525	0.49	0.25	169	5.01
1x50	20004813	5DL1115	15.6	16.6	610	750	0.51	0.25	211	7.15
1x70	20004814	5DL1116	17.8	18.8	825	1050	0.59	0.24	261	10.01
1x95	20004815	5DL1117	19.7	20.7	1050	1425	0.6	0.24	314	13.59
1x120	20004816	5DL1118	22.4	23.4	1360	1800	0.69	0.23	367	17.16
1x150	20004817	5DL1120	24.4	25.4	1640	2250	0.69	0.23	422	21.45
1x185	20069571	5DL1121	27.2	28.8	2040	2775	0.68	0.23	481	26.46
1x240	20004818	5DL1122	30.4	32	2600	3600	0.73	0.23	571	34.32
1x300	20004819	5DL1123	34.5	36.8	3270	4500	0.76	0.23	681	42.9
PROTOMONT NSSHÖU-O 2x...										
2x1,5	20004826	5DL1204	10.8	11.9	160	45	0.22	0.33	23	0.21
2x2,5	20008593	5DL1205	12	13	205	75	0.23	0.32	30	0.36
2x4		5DL1206	14.5	15.5	295	120	0.26	0.31	41	0.57
PROTOMONT NSSHÖU-O 3x...										
3x1,5		5DL1756	11.3	12.3	180	68	0.22	0.33	23	0.21
3x2,5	20004872	5DL1751	12.5	13.6	230	113	0.23	0.32	30	0.36
3x4		5DL1760	15.1	16.2	340	180	0.26	0.31	41	0.57
3x6		5DL1946	16.2	17.3	415	270	0.3	0.29	53	0.86
3x10		5DL1944	20	21.1	650	450	0.32	0.28	74	1.43
3x16		5DL1311	23.1	24.2	890	720	0.42	0.26	99	2.29
3x25		5DL1964	26.8	28.5	1300	1125	0.42	0.26	131	3.58
3x35	20004837	5DL1391	30.9	32.5	1730	1575	0.49	0.25	162	5.01
3x50	20148227	5DL1320	35.2	38.3	2400	2250	0.39	0.27	202	7.15
PROTOMONT NSSHÖU-J 3x...										
3x1,5	20004827	5DL1304	11.3	12.3	180	68	0.22	0.33	23	0.21
3x2,5	20004828	5DL1305	12.5	13.6	230	113	0.23	0.32	30	0.36
3x4	20007174	5DL1306	15.2	16.2	340	180	0.26	0.31	41	0.57
3x6		5DL1914	16.2	17.3	415	270	0.3	0.29	53	0.86
PROTOMONT NSSHÖU-J 4x...										
4x1,5	20004838	5DL1404	12	13.1	210	90	0.22	0.33	23	0.21
4x2,5	20004839	5DL1405	14.6	15.7	310	150	0.23	0.32	30	0.36
4x4	20004840	5DL1406	16.2	17.3	410	240	0.26	0.31	41	0.57
4x6	20004841	5DL1407	17.4	18.5	500	360	0.3	0.29	53	0.86
4x10	20004842	5DL1410	21.8	22.9	800	600	0.32	0.28	74	1.43
4x16	20004843	5DL1412	25.9	27.6	1160	960	0.42	0.26	99	2.29
4x16+4x2,5	20004871	5DL1749	27.1	30.1	1433	960	0.42	0.26	99	2.29
4x25	20004844	5DL1413	30.6	32.3	1700	1500	0.42	0.26	131	3.58
4x35	20004845	5DL1414	33.4	35.1	2150	2100	0.49	0.25	162	5.01
4x50	20004846	5DL1415	38.2	41.2	2980	3000	0.51	0.25	202	7.15
4x70	20004847	5DL1416	42.4	45.5	3910	4200	0.59	0.24	250	10.01
4x95	20004848	5DL1417	48.2	52.3	5120	5700	0.6	0.24	301	13.59
4x120	20016763	5DL1418	54.7	58.8	6570	7200	0.69	0.23	352	17.16

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Net weight approx. kg/km	Permis-sible tensile force max. N	Nominal operating capacitance µF/km	Induc-tance nom. mH/ km	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
4x150	20023637	5DL1420	60.2	64.2	7990	9000	0.7	0.23	404	21.45
4x185	20007494	5DL1421	67.3	71.3	9820	11100	0.71	0.23	461	26.46
4x240	20060343	5DL1422	72.1	76.4	12100	14400	0.73	0.23	547	34.32
PROTOMONT NSSHÖU-J 3x.../...										
3x50/25	20004863	5DL1715	38.2	41.2	2820	2250	0.51	0.25	202	7.15
3x70/35	20004864	5DL1716	42.4	45.5	3670	3150	0.59	0.24	250	10.01
3x95/50	20004865	5DL1717	48.2	52.3	4840	4275	0.6	0.24	301	13.59
3x120/70	20004866	5DL1718	54.7	58.8	6250	5400	0.69	0.23	352	17.16
3x150/70	20004868	5DL1722	60.2	64.2	7500	6750	0.7	0.23	404	21.45
3x185/95	20004867	5DL1721	67.3	71.3	9290	8325	0.71	0.23	461	26.46
PROTOMONT NSSHÖU-J 3x... +3x.../3										
3x185 + 3x95/3		5DL1973	60.7	64.7	8690	8325	0.71	0.23	461	26.46
PROTOMONT NSSHÖU-J 5x...										
5x1,5	20004855	5DL1504	12.9	14	245	113	0.22	0.33	23	0.21
5x2,5	20004856	5DL1505	15.7	16.7	360	188	0.23	0.32	30	0.36
5x4	20004857	5DL1506	17.4	18.5	475	300	0.26	0.31	41	0.57
5x6	20004858	5DL1507	19.6	20.6	625	450	0.3	0.29	53	0.86
5x10	20004859	5DL1510	23.5	24.5	955	750	0.32	0.28	74	1.43
5x16	20004860	5DL1512	28	29.7	1380	1200	0.42	0.26	99	2.29
5x25	20004861	5DL1513	33.1	34.8	2030	1875	0.42	0.26	131	3.58
5x35	20006970	5DL1514	37	40.1	2700	2625	0.49	0.25	162	5.01
PROTOMONT NSSHÖU-J ...x1,5										
7x1,5	20004891	5DL1933	15.9	16.9	365	158	0.22	0.33	15	0.21
8x1,5	20004890	5DL1931	17.1	18.1	410	180	0.22	0.33	14	0.21
10x1,5	20004886	5DL1879	17.7	19.7	455	225	0.22	0.33	13	0.21
24x1,5	20088402	5DL1907	24.3	27.3	920	540	0.22	0.33	9	0.21
PROTOMONT NSSHÖU-J ...x2,5										
7x2,5	20004887	5DL1911	18	18.9	485	263	0.24	0.32	19	0.36
10x2,5	20174408	5DL1748	20.4	21.4	630	375	0.24	0.32	16	0.36
12x2,5	20004874	5DL1755	21.7	22.7	725	450	0.24	0.32	16	0.36
18x2,5	20004892	5DL1937	25.6	27.5	1035	675	0.24	0.32	13	0.36
24x2,5		5DL1842	28.6	30.2	1320	900	0.23	0.32	12	0.36
PROTOMONT NSSHÖU-J ...x4										
7x4	20059552	5DL1750	21	22	685	420	0.26	0.31	17	0.57
12x4	20040505	5DL1957	24.9	26.5	1030	720	0.26	0.31	12	0.57
PROTOMONT NSSHÖU-J ...x10										
7x10+5x1,5ST	20004896	5DL1962	26	29	1420	1050	0.33	0.28	28	1.43
7x4+5x1,5ST	20004893	5DL1938	24.1	26.1	901	420	0.26	0.31	17	0.57

(1) Nominal current carrying capacity for multicore cable or three single-core cables in trefoil in permanent operation with DC or AC with 50 up to 60 Hz at 30°C ambient temperature, free in air, three cores loaded. (see also VDE 0298-4)

NOTES

MS-TECWATER
(N)TSWOEU

Application
MS-TECWATER rubber-sheathed cables (N)TSWOEU are intended for connection of electrical equipment in contaminated water and for heavy mechanical stresses, e.g. submersible pumps in sewage disposal and treatment as well as submersible mixer. Due to the various substances in the contaminated water, the cables may be used only in easily accessible areas that can be inspected
(installation depth of approx. 10 m, as normally used in sewage water tanks). These cables are also suitable for use in process water, cooling water, mine surface water, rainwater and combined waste water. They further can be used in groundwater and seawater; less stringent specifications in terms of accessibility and inspection can be imposed (in such cases the cables can be used at depths up to 2000 m). Water types are defined in accordance with DIN 4045 and DIN 4046.
If the water concerned is aggressive or composed of special substances, the cable's resistance properties should be examined. These cables can be used indoors, outdoors, in explosion-hazard areas.
In other respects the specifications of DIN VDE 0298 part 3 apply.

Global data

Brand	TECWATER
Type designation	(N)TSWOEU
Standard	Based on EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Plain copper, finely stranded class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Ozone, water and weather resistant insulation compound, base EPR (Ethylene-Propylene Rubber)
Electrical field control	Inner layer of semiconductive rubber compound
Color code	Cores light, printed with black numbers
Inner sheath	For all multi core cables with cross-section more than 6mm²: Inner layer of CPE special compound; color: blue
Outer sheath	Special rubber compound based on CPE, water and oil-resistant
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	3.6/6 kV
Max. permissible operating voltage AC	4.2/7.2 kV
Max. permissible operating voltage DC	5.4/10.8 kV
AC Test Voltage	11 kV (5 Min.)

Chemical parameters

Flame propagation	DIN EN 60332-1-2
Resistance to oil	DIN EN 60811-404
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	40 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm²
Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A
1x16		5DK3130	15.7	17.2	103	172	390	240	142	170
1x25		5DK3131	16.5	18	108	180	480	375	188	225
1x35		5DK3132	17.7	19.2	115	192	600	525	232	278
1x50		5DK3133	19.1	20.6	124	206	750	750	289	347
1x70		5DK3134	21.7	23.2	139	232	1010	1050	358	429
3x16		5DK3137	29.1	32.1	193	321	1330	720	104	125
3x25		5DK3138	31.8	34.8	209	348	1710	1125	138	165
3x35		5DK3139	34.4	37.4	224	374	2120	1575	171	205
3x50		5DK3140	38.8	41.8	251	418	2790	2250	213	255
3x70		5DK3141	42.5	45.5	273	455	3550	3150	263	316
3x16 /16		5DK3147	33.3	36.3	218	363	1730	720	104	125
3x25 /25		5DK3148	35	38	228	380	2110	1125	138	165
3x35 /35		5DK3149	39.1	42.1	253	421	2730	1575	171	205
3x50 /50	20038161	5DK3150	42.7	45.7	274	457	3470	2250	213	255
3x70 /70		5DK3151	46.8	49.8	299	498	4450	3150	263	316
3x25 + 3x25/3	20004484	5DK3156	31.8	34.8	209	348	1860	1125	138	165
3x35 + 3x25/3		5DK3157	34.4	37.4	224	374	2260	1575	171	205
3x50 + 3x25/3		5DK3158	38.8	41.8	251	418	2930	2250	213	255
3x70 + 3x35/3		5DK3159	42.5	45.5	273	455	3770	3150	263	316

Current carrying capacity in water: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient water temperature, two or three cores loaded, multi-core cables all cores loaded (cable compete immersed in water).
(2) Current carrying capacity free in air: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, two or three cores loaded, multi-core cables all cores loaded (see also DIN VDE 298-4).

Industry cables

WATER -
CABLES FOR DRINKING WATER

Designation	Standard	Model	Rated Voltage	Water temp. max.	Approvals
HYDROFIRM(T) S07BB-F	based on DIN EN 50525-2-21	round	450/750 V	60°C	Elastomerleit-linie (ELL), ACS
HYDROFIRM(T) S07BBH2-F	based on DIN EN 50525-2-21	flat	450/750 V	60°C	Elastomerleit-linie (ELL), ACS
HYDROFIRM(T) S1BB-F	based on DIN EN 50525-2-21	round	0.6/1 kV	60°C	Elastomerleit-linie (ELL), ACS
HYDROFIRM(T) S1BBH2-F	based on DIN EN 50525-2-21	flat	0.6/1 kV	60°C	Elastomerleit-linie (ELL), ACS
HYDROFIRM(T) EMV-FC S1BC4B-F	based on DIN EN 50525-2-21	round	0.6/1 kV	60°C	Elastomerleit-linie (ELL), ACS
TML	based on DIN EN 50525-2-21	round / flat	0.6/1 kV	60°C	Elastomerleit-linie (ELL), ACS
MS-HYDROFIRM(T) (N)TSW	based on DIN VDE 0250-813	round	3.6/6 kV	60°C	Elastomerleit-linie (ELL), ACS

HYDROFIRM(T)
S07BB-F

Application
HYDROFIRM(T) rubber-sheathed cables S07BB-F are intended for connection of electrical equipment in water and for medium mechanical stresses, e.g. submersible pumps, lowering of water level and booster plants. These cables are also suitable for use in drinking water, cooling water, surface water, rainwater. They further can be used in groundwater and seawater (salt water) up to 2000 m water depth. The outer sheath fulfills the requirements of health according to the "Elastomerleitlinien (ELL)" of the German "Umwelt Bundesamt" and the Attestation de Conformité Sanitaire (ACS) according to the French law. When corrosive water is involved, or water of some other special compositions must be investigated in each individual case. They may not be used in water containing more than 0,5 mg/l of chlorine.
These cables can be used indoors, outdoors, in industrial and agricultural plant, but not in explosion-hazard areas.
For protected, fixed installation within equipment, pipes or wells, as well as for rotor connections, these cables may be operated with an AC voltage to 1000 V or a DC voltage to 750 V with respect to earth. The permissible AC voltage for motor tests is 3 kV for a maximum duration of 3 minutes. In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	HYDROFIRM (T)
Type designation	S07BB-F
Standard	Based on EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Plain copper, finely stranded class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Ozone, water and weather resistant insulation compound, base EPR (Ethylene-Propylene Rubber)
Color code	up to 5 cores: colored in accordance with DIN VDE 0293-308 more than 5 cores: DIN EN 50525-1 Annex D
Outer sheath	EPR special compound type EM6 according to DIN EN 50363-2-1; water resistant; Compound 3G357
Outer Sheath Colour	Blue

Electrical parameters

Rated voltage	450/750V
Max. permissible operating voltage AC	0.476/0.825 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC Test Voltage	2.5 kV (15 Min.)

Chemical parameters

Compatibility to drinking water	ACS - France
Compatibility to drinking water	ELL - (Elastomerleitlinie of Umwelt Bundesamt) Germany
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	60 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-50 °C
Ambient temp. in fully flex. operation min.	-50 °C

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
1x1,5	20003697	5DH1302	5.7	6.4	19	19	50	23	33	40	0.21
1x6		5DH1305	8.2	8.9	27	36	116	90	76	91	0.86
1x10	20003698	5DH1306	9.8	11	33	44	173	150	106	127	1.43
1x16	20003699	5DH1307	11.5	12.7	51	64	265	240	142	170	2.29
1x25	20003700	5DH1308	13.2	14.4	58	72	375	375	188	225	3.56
1x35	20003701	5DH1310	14.9	16.4	66	82	485	525	232	278	5
1x50	20003702	5DH1311	17	18.5	74	93	670	750	289	347	7.15
1x70	20003703	5DH1312	18.6	20.1	80	101	859	1050	358	429	10
1x95	20003704	5DH1313	21.9	23.4	94	117	1141	1425	431	517	13.59
1x120	20003705	5DH1314	24.1	25.6	102	128	1436	1800	504	605	17.16
1x150	20003706	5DH1315	26.4	28.6	114	143	1777	2250	578	694	21.45
1x240	20003707	5DH1317	31.5	34	136	170	2900	3600	783	940	34.32
1x300	20014333	5DH1318	34.5	37.5	150	188	3500	4500	906	1087	42.9
1x400	20038391	5DH1319	38.5	41.9	168	210	4550	6000	1045	1254	57.2
1G50	20064586	5DH1661	17.5	18.5	74	93	700	750	289	347	7.15
1G70	20064585	5DH1662	19	20	80	100	950	1050	358	429	10
1G95	20064584	5DH1663	21.9	23.4	94	117	1200	1425	431	517	13.59
1G120	20064583	5DH1664	24.3	26	104	130	1500	1800	504	605	17.16
3x1,5		5DH1332	9.4	10.4	31	42	130	68	24	29	0.21
3x2,5	20003708	5DH1333	10.9	12.5	50	63	187	113	32	38	0.36
3x4	20003709	5DH1334	12.5	14.1	56	71	252	180	43	52	0.57
3x6	20003710	5DH1335	14	15.6	62	78	334	270	56	67	0.86
3x10	20007854	5DH1336	19.8	21.8	87	109	665	450	78	93	1.43
3x16	20003711	5DH1337	23.6	25.6	102	128	968	720	104	125	2.29
3x25	20003712	5DH1338	27	30	120	150	1352	1125	138	165	3.56
3x35	20003713	5DH1340	30.5	33.5	134	168	1707	1575	171	205	5
3x50	20003714	5DH1341	35.6	38.6	154	193	2421	2250	213	255	7.15
3x70	20003715	5DH1342	39.7	42.7	171	214	3289	3150	263	316	10
3x95	20007182	5DH1343	45.6	48.6	194	243	4300	4275	317	380	13.59
3x120	20008893	5DH1344	48.2	51.2	205	256	5300	5400	371	445	17.16
3G1,5	20003716	5DH1352	9.4	10.4	31	42	137	68	24	29	0.21
3G2,5		5DH1353	10.9	12.5	50	63	197	113	32	38	0.36
3G4		5DH1354	12.5	14.1	56	71	269	180	43	52	0.57
4G1,5	20003717	5DH1362	10.1	11.7	35	47	157	90	24	29	0.21
4G2,5	20003718	5DH1363	12	13.6	54	68	235	150	32	38	0.36
4G4	20003719	5DH1364	14.2	15.8	63	79	335	240	43	52	0.57
4G6	20003720	5DH1365	15.5	17.5	70	88	428	360	56	67	0.86
4G10	20003721	5DH1366	20.9	22.9	92	115	746	600	78	93	1.43
4G16	20003722	5DH1367	24.5	27.5	110	138	1124	960	104	125	2.29
4G25	20003723	5DH1368	29.9	32.9	132	165	1668	1500	138	165	3.56
4G35	20003724	5DH1370	33.6	36.6	146	183	2184	2100	171	205	5
4G50	20003725	5DH1371	39.5	42.5	170	213	3034	3000	213	255	7.15
4G70	20003726	5DH1372	43.5	46.5	186	233	3975	4200	263	316	10
4G95	20001433	5DH1373	50.6	54.6	218	273	5529	5700	317	380	13.59
4G120	20003727	5DH1374	55.1	59.1	236	296	6771	7200	371	445	17.16
4G150	20023159	5DH1375	59.6	63.6	254	318	8250	9000	425	510	21.45
5x2,5	20040515	5DH1423	13.4	14.4	58	72	310	188	32	38	0.36
7G1,5		5DH1402	15.2	16.7	67	84	353	158	24	29	0.21

x = without ye/gn core; G = with ye/gn core

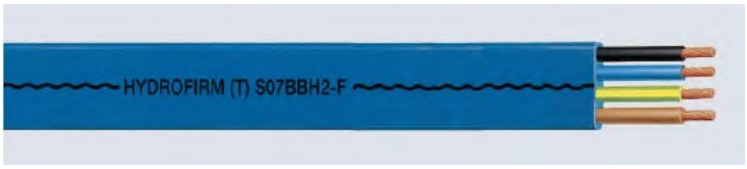
Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
7G2,5	20003729	5DH1412	17.2	18.9	76	95	494	263	32	38	0.36
7G4		5DH1422	20.7	22.7	91	114	714	420	43	52	0.57

Current carrying capacity in water: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient water temperature, two or three cores loaded, multi-core cables all cores loaded (cable compete immersed in water).
(2) Current carrying capacity free in air: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, two or three cores loaded, multi-core cables all cores loaded (see also DIN VDE 298-4).

x = without ye/gn core; G = with ye/gn core

NOTES

HYDROFIRM(T)
S07BBH2-F



Application

HYDROFIRM(T) rubber-sheathed cables S07BBH2-F are intended for connection of electrical equipment in water and for medium mechanical stresses, e.g. submersible pumps, lowering of water level and booster plants.
These cables are also suitable for use in drinking water, cooling water, surface water, rainwater. They further can be used in groundwater and seawater (salt water) up to 2000 m water depth. The outer sheath fulfills the requirements of health according to the "Elastomerleitlinien (ELL)" of the German "Umwelt Bundesamt" and the Attestation de Conformité Sanitaire (ACS) according to the French law. When corrosive water is involved, or water of some other special compositions must be investigated in each individual case. They may not be used in water containing more than 0,5 mg/l of chlorine.
These cables can be used indoors, outdoors, in industrial and agricultural plant, but not in explosion-hazard areas.
For protected, fixed installation within equipment, pipes or wells, as well as for rotor connections, these cables may be operated with an AC voltage to 1000 V or a DC voltage to 750 V with respect to earth. The permissible AC voltage for motor tests is 3 kV for a maximum duration of 3 minutes.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	HYDROFIRM (T)
Type designation	S07BBH2-F
Model	Flat
Standard	DIN EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Plain copper, finely stranded class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Ozone, water and weather resistant insulation compound, base EPR (Ethylene-Propylene Rubber)
Color code	up to 5 cores: colored in accordance with DIN VDE 0293-308 more than 5 cores: DIN EN 50525-1 Annex D
Outer sheath	EPR special compound type EM6 according to DIN EN 50363-2-1; water resistant; Compound 3G357
Outer Sheath Colour	Blue

Electrical parameters

Rated voltage	450/750V
Max. permissible operating voltage AC	0.476/0.825 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC Test Voltage	2.5 kV (15 Min.)

Chemical parameters

Compatibility to drinking water	ELL - (Elastomerleitlinie of Umwelt Bundesamt) Germany ACS - France
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	60 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-50 °C
Ambient temp. in fully flex. operation min.	-50 °C

Number of cores x cross section	Part number	MLFB Number	Min. Height (for flat cable) mm	Max. Height (for flat cable) mm	Min. Width (for flat cable) mm	Max. Width (for flat cable) mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
3x1,5	20055073	5DH1502	6	7.5	12.5	14	23	23	120	68	24	29	0.21
3x2,5	20003747	5DH1503	7	8.5	14.5	16.5	26	34	185	113	32	38	0.36
3x4	20003748	5DH1504	8	9.5	17	19	29	38	260	180	43	52	0.57
3x6	20007918	5DH1505	9	10.5	19	21.5	32	42	333	270	56	67	0.86
3x10	20003750	5DH1506	12.5	14.5	25	28	58	73	581	450	78	93	1.43
3x16	20003751	5DH1507	14.5	17	31	34	68	85	863	720	104	125	2.29
3x25	20003752	5DH1508	17	19	36.5	40	76	95	1300	1125	138	165	3.56
3x35	20003753	5DH1510	19	21.5	42	45.5	86	108	1643	1575	171	205	5
3x50	20003754	5DH1511	22	24	48.5	53	96	120	2245	2250	213	255	7.15
3x70	20003755	5DH1512	24	26.5	54.5	59	106	133	2990	3150	263	316	10
3x95	20041041	5DH1513	25.4	27.9	57	61.5	112	140	3740	4275	317	380	13.59
3x120	20003756	5DH1514	27.6	30.1	62.4	66.9	120	151	4530	5400	371	445	17.16
3x240		5DH1517	38.3	40.3	87	92	161	202	8904	10800	576	691	34.32
4G1,5	20003758	5DH1522	6	7.5	16	18.5	23	23	167	90	24	29	0.21
4G2,5	20003759	5DH1523	7	8.5	19	21.5	26	34	240	150	32	38	0.36
4G4	20003760	5DH1524	8	9.5	22.5	25.5	29	38	337	240	43	52	0.57
4G6	20003761	5DH1525	9.5	10.5	25.5	29	32	42	448	360	56	67	0.86
4G10	20003762	5DH1526	12.5	14.5	33	36.5	58	73	791	600	78	93	1.43
4G16	20003763	5DH1527	14.5	17	41	44.5	68	85	1162	960	104	125	2.29
4G25	20003764	5DH1528	17.5	20	49	53.5	80	100	1698	1500	138	165	3.56
4G35	20003765	5DH1530	19.5	22	56.5	60.5	88	110	2293	2100	171	205	5
4G50	20003766	5DH1531	22.5	25	66.5	69.5	100	125	3054	3000	213	255	7.15
4G70	20003767	5DH1532	25	28	73	77.5	112	140	4200	4200	263	316	10
4G95	20008720	5DH1533	27.5	29.5	78	82	118	148	5260	5700	317	380	13.59
4G150	20048350	5DH1535	32	35	96	100	140	175	8550	9000	425	510	21.45

(2) Current carrying capacity free in air: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, two or three cores loaded, multi-core cables all cores loaded (see also DIN VDE 298-4).
Current carrying capacity in water: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient water temperature, two or three cores loaded, multi-core cables all cores loaded (cable compete immersed in water).

x = without ye/gn core; G = with ye/gn core

HYDROFIRM(T)
S1BB-F

Application
HYDROFIRM(T) rubber-sheathed cables S1BB-F are intended for connection of electrical equipment in water and for medium mechanical stresses, e.g. submersible pumps, lowering of water level and booster plants.These cables are also suitable for use in drinking water, cooling water, surface water, rainwater. They further can be used in groundwater and seawater (salt water) up to 2000 m water depth. The outer sheath fulfills the requirements of health according to the "Elastomerleitlinien (ELL)" of the German "Umwelt Bundesamt" and the Attestation de Conformité Sanitaire (ACS) according to the French law. When corrosive water is involved, or water of some other special compositions must be investigated in each individual case. They may not be used in water containing more than 0,5 mg/l of chlorine.
These cables can be used indoors, outdoors, in industrial and agricultural plant, but not in explosion-hazard areas.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	HYDROFIRM (T)
Type designation	S1BB-F
Model	Round
Standard	Based on EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Plain copper, finely stranded class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Ozone, water and weather resistant insulation compound, base EPR (Ethylene-Propylene Rubber)
Color code	up to 5 cores: colored in accordance with DIN VDE 0293-308 more than 5 cores: DIN EN 50525-1 Annex D
Outer sheath	EPR special compound type EM6 according to DIN EN 50363-2-1; water resistant; Compound 3G357
Outer Sheath Colour	Blue

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC Test Voltage	3 kV (15 Min.)

Chemical parameters

Compatibility to drinking water	ACS - France ELL - (Elastomerleitlinie of Umwelt Bundesamt) Germany
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	60 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-50 °C
Ambient temp. in fully flex. operation min.	-50 °C

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
1x1,5	20007599	5DH8502	5.8	6.6	20	20	53	23	33	40	0.21
1x2,5		5DH8503	6.3	7	21	21	65	38	43	52	0.36
1x4		5DH8504	6.7	7.5	23	23	82	60	59	70	0.57
1x6		5DH8505	7.2	8	24	32	103	90	76	91	0.86
1x10		5DH8506	8.3	9.1	27	36	152	150	106	127	1.43
1x16	20159153	5DH8507	9.1	10.1	30	40	212	240	142	170	2.29
1x25	20119154	5DH8508	10.8	12.4	50	62	316	375	188	225	3.58
1x35	20004336	5DH8509	12.3	13.9	56	70	422	525	232	278	5.01
1x50	20004337	5DH8510	14.1	15.7	63	79	579	750	289	347	7.15
1x70	20004338	5DH8511	16.3	18.3	73	92	808	1050	358	429	10.01
1x95	20004339	5DH8512	18.8	20.3	81	102	1026	1425	431	517	13.59
1x120	20004340	5DH8513	20.9	22.9	92	115	1317	1800	504	605	17.16
1x150	20004341	5DH8514	23.2	25.2	101	126	1629	2250	578	694	21.45
1x185	20197815	5DH8515	26	28.3	113	142	1986	2775	660	792	26.46
1x240	20149227	5DH8516	28.9	31.2	125	156	2553	3600	783	940	34.32
1x300		5DH8517	32.1	34.4	138	172	3157	4500	906	1087	42.9
1x400		5DH8518	36.3	38.6	154	193	4094	6000	1045	1254	57.2
1x500		5DH8519	40.4	42.7	171	214	5168	7500	1203	1443	71.5
2x1	20025585	5DH8521	8	9	27	36	90	30	19	23	0.14
2x1,5		5DH8522	8.6	9.6	29	38	106	45	24	29	0.21
2x2,5		5DH8523	9.4	10.4	31	42	135	75	32	38	0.36
2x4	20182383	5DH8524	10.2	11.8	35	47	175	120	43	52	0.57
2x6		5DH8525	11.2	12.8	51	64	230	180	56	67	0.86
2x10		5DH8526	15	17	68	85	399	300	78	93	1.43
2x16		5DH8527	17.6	19.6	78	98	570	480	104	125	2.29
2x25		5DH8528	21.6	23.6	94	118	850	750	138	165	3.58
3G1,5	20014826	5DH8532	9.1	10.1	30	40	125	68	24	29	0.21
3G2,5	20112501	5DH8533	9.6	11.2	34	45	162	113	32	38	0.36
3G4	20014829	5DH8534	10.6	12.2	49	61	216	180	43	52	0.57
3x1		5DH8581	8.4	9.5	29	38	104	45	19	23	0.14
3x1,5		5DH8582	9.1	10.1	30	40	125	68	24	29	0.21
3x2,5		5DH8583	9.6	11.2	34	45	162	113	32	38	0.36
3x4		5DH8584	10.6	12.2	49	61	216	180	43	52	0.57
3x6		5DH8585	12.1	13.7	55	69	292	270	56	67	0.86
3x10		5DH8586	16.3	18.3	73	92	514	450	78	93	1.43
3x16	20197816	5DH8587	19.1	21.1	84	106	740	720	104	125	2.29
3x25	20197817	5DH8588	23.1	25.1	100	126	1094	1125	138	165	3.58
3x35	20197818	5DH8589	25.6	28.6	114	143	1459	1575	171	205	5.01
3x50	20114018	5DH8590	29.9	32.9	132	165	2018	2250	213	255	7.15
3x70	20148842	5DH8591	35.4	38.4	154	192	2808	3150	263	316	10.01
3x95	20052793	5DH8592	39	42	168	210	3547	4275	317	380	13.59
3x120	20197813	5DH8593	44.4	47.4	190	237	4542	5400	371	445	17.16
3x150	20197814	5DH8594	49	53	212	265	5627	6750	425	510	21.45
3x185	20197819	5DH8595	54.2	58.2	233	291	6819	8325	485	582	26.46
3x240	20197820	5DH8596	61.4	65.4	262	327	8645	10800	576	691	34.32
3x300		5DH8597	68.4	72.9	292	365	11081	13500	666	800	42.9
4G1		5DH8551	9.1	10.1	30	40	123	60	19	23	0.14
4G1,5	20004342	5DH8552	9.5	11.1	33	44	148	90	24	29	0.21

x = without ye/gn core; G = with ye/gn core

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
4G2,5	20004343	5DH8553	10.5	12.1	48	61	201	150	32	38	0.36
4G4	20004344	5DH8554	11.8	13.4	54	67	276	240	43	52	0.57
4G6	20004345	5DH8555	13.6	15.2	61	76	378	360	56	67	0.86
4G10	20004346	5DH8556	17.8	19.8	79	99	646	600	78	93	1.43
4G16	20004347	5DH8557	20.9	22.9	92	115	934	960	104	125	2.29
4G25	20004348	5DH8558	25.3	28.3	113	142	1418	1500	138	165	3.58
4G35	20004349	5DH8559	28.3	31.3	125	157	1877	2100	171	205	5.01
4G50	20004350	5DH8560	33.2	36.2	145	181	2613	3000	213	255	7.15
4G70	20004351	5DH8561	38.7	41.7	167	209	3638	4200	263	316	10.01
4G95	20004352	5DH8562	43.7	47.7	191	239	4643	5700	317	380	13.59
4G120	20130848	5DH8563	48.7	52.7	211	264	5833	7200	371	445	17.16
4G150	20141938	5DH8564	54.5	58.5	234	293	7222	9000	425	510	21.45
4G185		5DH8565	60.6	64.6	258	323	8830	11100	485	582	26.46
4G240	20149226	5DH8566	68.2	72.2	289	361	11457	14400	576	691	34.32
4G300		5DH8567	77	81	324	405	14368	18000	666	800	42.9

(2) Current carrying capacity free in air: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, two or three cores loaded, multi-core cables all cores loaded (see also DIN VDE 298-4).
Current carrying capacity in water: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient water temperature, two or three cores loaded, multi-core cables all cores loaded (cable compete immersed in water).

x = without ye/gn core; G = with ye/gn core

NOTES

HYDROFIRM(T)
S1BBH2-F

Application
HYDROFIRM(T) rubber-sheathed cables S1BBH2-F are intended for connection of electrical equipment in water and for medium mechanical stresses, e.g. submersible pumps, lowering of water level and booster plants.
These cables are also suitable for use in drinking water, cooling water, surface water, rainwater. They further can be used in groundwater and seawater (salt water) up to 2000 m water depth. The outer sheath fulfills the requirements of health according to the "Elastomerleitlinien (ELL)" of the German "Umwelt Bundesamt" and the Attestation de Conformité Sanitaire (ACS) according to the French law. When corrosive water is involved, or water of some other special compositions must be investigated in each individual case. They may not be used in water containing more than 0,5 mg/l of chlorine.
These cables can be used indoors, outdoors, in industrial and agricultural plant, but not in explosion-hazard areas.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	HYDROFIRM (T)
Type designation	S1BBH2-F
Model	Flat
Standard	Based on EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Plain copper, finely stranded class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Ozone, water and weather resistant insulation compound, base EPR (Ethylene-Propylene Rubber)
Color code	up to 5 cores: colored in accordance with DIN VDE 0293-308 more than 5 cores: DIN EN 50525-1 Annex D
Outer sheath	EPR special compound type EM6 according to DIN EN 50363-2-1; water resistant; Compound 3G357
Outer Sheath Colour	Blue

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC Test Voltage	3 kV (15 Min.)

Chemical parameters

Compatibility to drinking water	ELL - (Elastomerleitlinie of Umwelt Bundesamt) Germany ACS - France
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	60 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-50 °C
Ambient temp. in fully flex. operation min.	-50 °C

Number of cores x cross section	Part number	MLFB Number	Min. Height (for flat cable) mm	Max. Height (for flat cable) mm	Min. Width (for flat cable) mm	Max. Width (for flat cable) mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
3x1,5		5DH8602	5.3	6.3	11.3	12.2	19	19	117	68	24	29	0.21
3x2,5		5DH8603	6	7.5	12.5	14	23	23	161	113	32	38	0.36
3x4		5DH8604	7	8.3	14.5	16.6	25	33	223	180	43	52	0.57
3x6		5DH8605	8	9.5	17	19	29	38	300	270	56	67	0.86
3x10		5DH8606	9	10.5	19	21.5	32	42	461	450	78	93	1.43
3x16		5DH8607	12.5	14.5	25	28	58	73	767	720	104	125	2.29
3x25		5DH8608	14.5	17	31	34	68	85	1117	1125	138	165	3.58
3x35	20161286	5DH8609	17	19	36.5	40	76	95	1493	1575	171	205	5.01
3x50	20008473	5DH8610	19	21.5	42	45.5	86	108	2043	2250	213	255	7.15
3x70	20161595	5DH8611	22	24	48.5	53	96	120	2803	3150	263	316	10.01
3x95	20182905	5DH8612	23.5	26	52	56.5	104	130	3536	4275	317	380	13.59
3x120	20153436	5DH8613	26.4	29.4	59	63	118	147	4547	5400	371	445	17.16
3x150		5DH8614	29.1	32.1	66.4	70.9	128	161	5614	6750	425	510	21.45
3x185		5DH8615	32	35	73	78	140	175	6804	8325	485	582	26.46
4G1,5		5DH8622	6	7.5	16	18.5	23	23	174	90	24	29	0.21
4G2,5		5DH8623	6	7.5	16	18.5	23	23	214	150	32	38	0.36
4G4	20180659	5DH8624	7	8.5	19	21.5	26	34	301	240	43	52	0.57
4G6	20025268	5DH8625	8	9.5	22.5	25.5	29	38	411	360	56	67	0.86
4G10	20151819	5DH8626	9.5	10.5	25.5	29	32	42	623	600	78	93	1.43
4G16	20151820	5DH8627	12.5	14.5	33	36.5	58	73	1044	960	104	125	2.29
4G25	20119298	5DH8628	14.5	17	41	44.5	68	85	1514	1500	138	165	3.58
4G35	20007173	5DH8629	17.5	20	49	53	80	100	2102	2100	171	205	5.01
4G50	20007116	5DH8630	19.5	22	56.5	60.5	88	110	2840	3000	213	255	7.15
4G70	20096282	5DH8631	22.5	25	66.5	69.5	100	125	3896	4200	263	316	10.01
4G95	20119299	5DH8632	24	27	70.7	74.7	108	135	4867	5700	317	380	13.59
4G120		5DH8633	27.6	30.6	79.9	85.9	122	153	6291	7200	371	445	17.16
4G150		5DH8634	29.9	32.9	88.6	94.6	132	165	7678	9000	425	510	21.45

(2) Current carrying capacity free in air: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, two or three cores loaded, multi-core cables all cores loaded (see also DIN VDE 298-4).
Current carrying capacity in water: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient water temperature, two or three cores loaded, multi-core cables all cores loaded (cable compete immersed in water).

x = without ye/gn core; G = with ye/gn core

HYDROFIRM(T) EMC-FC
S1BC4B-F

Application
HYDROFIRM(T) rubber-sheathed cables S1BC4B-F are intended for connection of electrical equipment in water and for medium mechanical stresses, e.g. submersible pumps, lowering of water level and booster plants. Especially for frequency converter controlled AC drives and if considerable demands in respect of electromagnetic compatibility (EMC) according to the EMC directive imposes. For an effective shielding both ends of cable must have a good shield contact to ground. These cables are also suitable for use in drinking water, cooling water, surface water, rainwater. They further can be used in groundwater and seawater (salt water) up to 2000 m water depth. The outer sheath fulfills the requirements of health according to the "Elastomerleitlinien (ELL)" of the German "Umwelt Bundesamt" and the Attestation de Conformité Sanitaire (ACS) according to the French law. When corrosive water is involved, or water of some other special compositions must be investigated in each individual case. They may not be used in water containing more than 0,5 mg/l of chlorine.
These cables can be used indoors, outdoors, in industrial and agricultural plant, but not in explosion-hazard areas.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	HYDROFIRM (T)
Type designation	S1BC4B-F
Standard	Based on EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Plain copper, finely stranded class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Ozone, water and weather resistant insulation compound, base EPR (Ethylene-Propylene Rubber)
Color code	up to 5 cores: colored in accordance with DIN VDE 0293-308 more than 5 cores: DIN EN 50525-1 Annex D
Screen	Braid of tinned copper wires Maximum transfer impedance 30Ω/km at 30MHz
Outer sheath	EPR special compound type EM6 according to DIN EN 50363-2-1:2006-10; water resistant; Compound 3G357
Outer Sheath Colour	Blue

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC Test Voltage	5 kV (5 Min.)

Chemical parameters

Compatibility to drinking water	ELL - (Elastomerleitlinie of Umwelt Bundesamt) Germany ACS - France
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	60 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-50 °C
Ambient temp. in fully flex. operation min.	-50 °C

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
3x1,5/1,5 KON		5DH8742	9.5	11.1	33	44	171	67	24	29	0.21
3x2,5/2,5 KON	20026461	5DH8743	10.5	12.1	48	61	225	112	32	38	0.36
3x4/4 KON	20040091	5DH8744	11.8	13.4	54	67	304	180	43	52	0.57
3x6/6 KON	20006934	5DH8745	13.6	15.2	61	76	382	270	56	67	0.86
3x10/10 KON		5DH8746	17.8	19.8	79	99	680	450	78	93	1.43
3x16/16 KON	20006935	5DH8747	20.9	22.9	92	115	1016	720	104	125	2.29
3x25+3G16/3		5DH8748	25.3	28.3	113	142	1448	1125	138	165	3.58
3x35+3G16/3	20036153	5DH8749	28.3	31.3	125	157	1845	1575	171	205	5.01
3x50+3G25/3	20194972	5DH8750	33.2	36.2	145	181	2582	2250	213	255	7.15
3x70+3G35/3	20169250	5DH8751	38.7	41.7	167	209	3560	3150	263	316	10.01
3x95+3G50/3	20096401	5DH8752	43.7	47.7	191	239	4560	4275	317	380	13.59
3x120+3G70/3	20157144	5DH8753	48.8	51.8	207	259	5685	5400	371	445	17.16

Current carrying capacity in water: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient water temperature, two or three cores loaded, multi-core cables all cores loaded (cable compete immersed in water).
(2) Current carrying capacity free in air: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, two or three cores loaded, multi-core cables all cores loaded (see also DIN VDE 298-4).

TML round type B

Application

TML rubber-sheathed cables are intended for connection of electrical equipment in water and for medium mechanical stresses, e.g. submersible pumps, lowering of water level and booster plants.
These cables are also suitable for use in drinking water, cooling water, surface water, ainwater. They further can be used in groundwater and seawater (salt water) up to 2000 m water depth. The outer sheath fulfills the requirements of health according to the "Elastomerleitlinien (ELL)" of the German "Umwelt Bundesamt" and the Attestation de Conformité Sanitaire (ACS) according to the French law.
When corrosive water is involved, or water of some other special compositions must be investigated in each individual case. They may not be used in water containing more than 0,5 mg/l of chlorine.
These cables can be used indoors, outdoors, in industrial and agricultural plant, but not in explosion-hazard areas.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	TML
Model	Round
Standard	Based on EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	plain annealed copper, flexible class 5 acc. to DIN EN 60228 / IEC 60228
Insulation	Ozone, water and weather resistant insulation compound, base EPR (Ethylene-Propylene Rubber)
Color code	up to 5 cores: colored in accordance with DIN VDE 0293-308 more than 5 cores: DIN EN 50525-1 Annex D
Outer sheath	EPR special compound type EM6 according to DIN EN 50363-2-1; water resistant; Compound 3G357
Outer Sheath Colour	Blue

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC Test Voltage	3 kV (5 Min.)

Chemical parameters

Compatibility to drinking water	ACS - France ELL - (Elastomerleitlinie of Umwelt Bundesamt) Germany
Water resistance	EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	60 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Mechanical parameters

Min. bending radius	Acc. to DIN VDE 0298 part 3

Number of cores x cross section	Part number	Outer dia-meter nom. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
1x1,5	20006530	6	24	36	50	23	33	40	0.21
1x2,5		6.6	26.4	39.6	65	38	43	52	0.36
1x4		7.5	30	45	90	60	59	70	0.57
1x6		8.3	33.2	49.8	120	90	76	91	0.86
1x10		10.1	40.4	60.6	185	150	106	127	1.43
1x16	20024982	11.3	45.2	67.8	255	240	142	170	2.29
1x25	20006531	13.5	54	81	365	375	188	225	3.58
1x35	20006532	15.2	60.8	91.2	490	525	232	278	5.01
1x50	20006533	17.5	70	105	690	750	289	347	7.15
1x70	20006534	20.3	81.2	121.8	920	1050	358	429	10
1x95	20006535	22.7	90.8	136.2	1210	1425	431	517	13.6
1x120	20006536	24.5	98	147	1455	1800	504	605	17.2
1x150	20006537	28	112	168	1825	2250	578	694	21.5
1x185	20006538	30	120	180	2160	2775	660	792	26.5
2x1	20055241	8.2	32.8	49.2	95	30	19	23	0.14
3x0,75	20006540	8	32	48	90	34	16	19	0.11
3x1,5	20006541	9.7	38.8	58.2	135	68	24	29	0.21
3x2,5		11.4	45.6	68.4	210	113	32	38	0.36
3x4		13	52	78	280	180	43	52	0.57
3x6		14.5	58	87	370	270	56	67	0.86
3x10	20006546	20	80	120	650	450	78	93	1.43
3x16	20006547	24	96	144	940	720	104	125	2.29
3x25	20006548	27.7	110.8	166.2	1320	1125	138	165	3.58
3x35	20006549	31	124	186	1730	1575	171	205	5.01
3x50		36	144	216	2440	2250	213	255	7.15
4G1,5	20006551	10.7	42.8	64.2	165	90	24	29	0.21
4G2,5	20006552	12.6	50.4	75.6	235	150	32	38	0.36
4G4	20006553	14.4	57.6	86.4	335	240	43	52	0.57
4G6	20006554	16.2	64.8	97.2	460	360	56	67	0.86
4G10	20006555	21.9	87.6	131.4	800	600	78	93	1.43
4G16	20006556	26.2	104.8	157.2	1165	960	104	125	2.29
4G25	20006557	30.2	120.8	181.2	1650	1500	138	165	3.58
4G35	20006558	34.5	138	207	2200	2100	171	205	5.01
4G50	20006559	41.4	165.6	248.4	3260	3000	213	255	7.15
4G70	20006560	45.7	182.8	274.2	4149	4200	263	316	10

(2) Current carrying capacity free in air: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, two or three cores loaded, multi-core cables all cores loaded (see also DIN VDE 298-4).
Current carrying capacity in water: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient water temperature, two or three cores loaded, multi-core cables all cores loaded (cable compete immersed in water).

x = without ye/gn core; G = with ye/gn core

TML flat type B

Application

TML rubber-sheathed cables are intended for connection of electrical equipment in water and for medium mechanical stresses, e.g. submersible pumps, lowering of water level and booster plants.
These cables are also suitable for use in drinking water, cooling water, surface water, ainwater. They further can be used in groundwater and seawater (salt water) up to 2000 m water depth. The outer sheath fulfills the requirements of health according to the "Elastomerleitlinien (ELL)" of the German "Umwelt Bundesamt" and the Attestation de Conformité Sanitaire (ACS) according to the French law.
When corrosive water is involved, or water of some other special compositions must be investigated in each individual case. They may not be used in water containing more than 0,5 mg/l of chlorine.
These cables can be used indoors, outdoors, in industrial and agricultural plant, but not in explosion-hazard areas.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	TML
Model	Flat
Standard	Based on EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Plain copper, finely stranded class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Ozone, water and weather resistant insulation compound, base EPR (Ethylene-Propylene Rubber)
Color code	up to 5 cores: colored in accordance with DIN VDE 0293-308 more than 5 cores: DIN EN 50525-1 Annex D
Outer sheath	EPR special compound type EM6 according to DIN EN 50363-2-1; water resistant; Compound 3G357
Outer Sheath Colour	Blue

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC Test Voltage	3 kV (5 Min.)

Chemical parameters

Compatibility to drinking water	ELL - (Elastomerleitlinie of Umwelt Bundesamt) Germany ACS - France
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	60 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Number of cores x cross section	Part number	Min. Height (for flat cable) mm	Max. Height (for flat cable) mm	Min. Width (for flat cable) mm	Max. Width (for flat cable) mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
3G1,5	20006584	6.3	6.7	12.9	13.5	140	68	24	29	0.21
3x1,5		6.3	6.7	12.9	13.5	140	68	24	29	0.21
3x2,5	20006585	7.1	7.5	15	15.6	190	113	32	38	0.36
3x4	20006586	8	9	17.3	18.3	270	180	43	52	0.57
3x6	20006587	9	10	19	20	360	270	56	67	0.86
3x10	20006588	11	12	24	25	570	450	78	93	1.43
3x16	20006589	11.7	12.7	28.3	29.3	760	720	104	125	2.29
3x25	20006590	15.5	16.5	37	38	1250	1125	138	165	3.58
3x35	20006591	15.5	17.5	37.5	39.5	1500	1575	171	205	5.01
3x50		18.5	20.5	45.5	47.5	2180	2250	213	255	7.15
4G1,5	20006592	6.3	6.7	15.9	16.5	170	90	24	29	0.21
4G2,5	20006593	6.8	7.2	18.7	19.3	240	150	32	38	0.36
4G4	20006594	7.7	8.7	22.5	23.5	350	240	43	52	0.57
4G6	20006595	8.5	9.5	24.5	25.5	450	360	56	67	0.86
4G10	20006596	10	11	29.5	30.5	690	600	78	93	1.43
4G16	20024741	12.3	13.3	37.5	38.5	1040	960	104	125	2.29
4G25	20051064	13.7	15.3	43.5	45.1	1490	1500	138	165	3.58
4G35	20006597	15.5	17.5	47.5	49.5	1970	2100	171	205	5.01

Current carrying capacity in water: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient water temperature, two or three cores loaded, multi-core cables all cores loaded (cable compete immersed in water).
(2) Current carrying capacity free in air: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, two or three cores loaded, multi-core cables all cores loaded (see also DIN VDE 298-4).

x = without ye/gn core; G = with ye/gn core

MS-HYDROFIRM(T)
(N)TSW

Application

MS- HYDROFIRM(T) rubber-sheathed cables (N)TSW are intended for connection of electrical equipment in water and for medium mechanical stresses, e.g. submersible pumps, lowering of water level and booster plants. These cables are also suitable for use in drinking water, cooling water, surface water, rainwater. They further can be used in groundwater and seawater (salt water) up to 2000 m water depth. The outer sheath fulfills the requirements of health according to the "Elastomerleitlinien (ELL)" of the German "Umwelt Bundesamt" and the Attestation de Conformité Sanitaire (ACS) according to the French law.
When corrosive water is involved, or water of some other special compositions must be investigated in each individual case. They may not be used in water containing more than 0,5 mg/l of chlorine.
These cables can be used indoors, outdoors, in industrial and agricultural plant, but not in explosion-hazard areas.
In other respects the specifications of DIN VDE 0298-3 apply.

Global data

Brand	HYDROFIRM (T)
Type designation	(N)TSW
Standard	DIN VDE 0298-4 Based on DIN VDE 0250-813

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Plain copper, finely stranded class 5 in accordance with DIN EN 60228 / IEC 60228
Insulation	Ozone, water and weather resistant insulation compound, base EPR (Ethylene-Propylene Rubber)
Electrical field control	Inner layer of semiconductive rubber compound
Color code	Power cores: light color with black numbering; PE core: green-yellow
Outer sheath	EPR special compound type EM6 according to DIN EN 50363-2-1; water resistant; Compound 3G357
Outer Sheath Colour	Blue

Electrical parameters

Rated voltage	3.6/6 kV
Max. permissible operating voltage AC	4.2/7.2 kV
Max. permissible operating voltage DC	5.4/10.8 kV
AC Test Voltage	11 kV (5 Min.)

Chemical parameters

Compatibility to drinking water	ELL - (Elastomerleitlinie of Umwelt Bundesamt) Germany ACS - France
Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Max. permissible water temperature	60 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-40 °C
Ambient temp. in fully flex. operation min.	-25 °C

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity free in air (2) A	Current carrying capacity in water A	Short Circuit Current (conduc-tor) kA
1x16		5DK3164	15.7	17.2	103	172	382	240	142	170	2.29
1x25		5DK3165	16.5	18	108	180	470	375	188	225	3.56
1x35		5DK3166	17.7	19.2	115	192	588	525	232	278	5
1x50		5DK3167	19.1	20.6	124	206	735	750	289	347	7.15
1x70		5DK3168	21.7	23.2	139	232	990	1050	358	429	10
3x16		5DK3171	29.1	32.1	193	321	1305	720	104	125	2.29
3x25		5DK3172	31.8	34.8	209	348	1675	1125	138	165	3.56
3x35		5DK3173	34.4	37.4	224	374	2079	1575	171	205	5
3x50		5DK3174	38.8	41.8	251	418	2735	2250	213	255	7.15
3x70		5DK3175	42.5	45.5	273	455	3480	3150	263	316	10
3x16/16		5DK3181	33.3	36.3	218	363	1695	960	104	125	2.29
3x25/25	20025998	5DK3182	35	38	228	380	2110	1500	138	165	3.56
3x35/35		5DK3183	39.1	42.1	252	421	2675	2100	171	205	5
3x50/50		5DK3184	42.7	45.7	274	457	3400	3000	213	255	7.15
3x70/70		5DK3185	46.8	49.8	299	498	4365	4200	263	316	10
3x25+3x25/3		5DK3190	31.8	34.8	209	348	1823	1125	138	165	3.56
3x35+3x25/3		5DK3191	34.4	37.4	224	374	2215	1575	171	205	5
3x50+3x25/3		5DK3192	38.8	41.8	251	418	2875	2250	213	255	7.15
3x70+3x35/3		5DK3193	42.5	45.5	273	455	3695	3150	263	316	10

(2) Current carrying capacity free in air: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, two or three cores loaded, multi-core cables all cores loaded (see also DIN VDE 298-4).
Current carrying capacity in water: The values are valid for permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient water temperature, two or three cores loaded, multi-core cables all cores loaded (cable compete immersed in water).

Industry cables

WATER -
CABLES FOR HOT WATER

Designation	Standard	Model	Conductor temp. max.	Water temp. max.	Outer sheath
HYDROFIRM TGSH	dimensions based on DIN EN 50525-2-21	round	130°C	110°C	HEPR
HYDROFIRM TGSH2G	dimensions based on DIN EN 50525-2-21	round	150°C	120°C	SiR

HYDROFIRM
TGSH

Application
HYDROFIRM rubber-sheathed cables TGSH are intended for connection of electrical equipment in hot water and for medium mechanical stresses. These cables are also suitable for use in industrial water, cooling water, surface water, rainwater, groundwater and seawater (salt water) up to 2000 m water depth. When corrosive water is involved, or water of some other special compositions must be investigated in each individual case.
These cables can be used indoors, outdoors, in industrial and agricultural plant, but not in explosion-hazard areas.
For protected, fixed installation within equipment, pipes or wells, as well as for rotor connections, these cables may be operated with an AC voltage to 1000 V or a DC voltage to 750 V with respect to earth. The permissible AC voltage for motor tests is 3 kV for a maximum duration of 3 minutes.
In other respects the specifications of DIN EN50565-2 apply.

Global data

Brand	HYDROFIRM
Type designation	TGSH
Standard	Based on EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Copper, tinned, finely stranded, class 5 according to DIN EN 60228 / IEC 60228
Insulation	Ozone, weather, heat and water resistant insulation compound, base SIR
Color code	up to 5 cores: colored in accordance with DIN VDE 0293-308 more than 5 cores: DIN EN 50525-1 Annex D
Outer sheath	Special compound, base HEPR
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	450/750V
Max. permissible operating voltage AC	0.476/0.825 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC test voltage	2.5 kV
Duration of AC test voltage	15 min.

Chemical parameters

Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. short circuit temperature of the conductor	350 °C (max. 5 s)
Max. permissible water temperature	110 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-50 °C
Ambient temp. in fully flex. operation min.	-50 °C

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
1 x 1.5	-O		5DH1	5.7	6.4	19	19	50	22.5	14	0.23
1 x 6	-O		5DH1	8.2	8.9	36	27	116	90	32	0.93
1 x 10	-O		5DH1	9.8	11	44	33	173	150	45	1.55
1 x 16	-O		5DH1	11.5	12.7	64	51	265	240	60	2.48
1 x 25	-O	20182903	5DH1	13.2	14.4	72	58	375	375	79	3.88
1 x 35	-O		5DH1	14.9	16.4	82	66	485	525	98	5.43
1 x 50	-O		5DH1	17	18.5	93	74	670	750	122	7.75
1 x 70	-O	20203102	5DH1	18.6	20.1	101	80	859	1050	151	10.85
3 x 1.5	-O		5DH1	9.4	10.4	42	31	130	67.5	13	0.23
3 x 2.5	-O	20163258	5DH1	10.9	12.5	63	50	187	112.5	17	0.39
3 x 4	-O		5DH1	12.5	14.1	71	56	252	180	24	0.62
3 x 6	-O		5DH1	14	15.6	78	62	334	270	31	0.93
3 x 10	-O		5DH1	19.8	21.8	109	87	665	450	43	1.55
3 x 16	-O		5DH1	23.6	25.6	128	102	968	720	57	2.48
3 x 25	-O		5DH1	27	30	150	120	1352	1125	76	3.88
3 x 35	-O		5DH1	30.5	33.5	168	134	1707	1575	94	5.43
3 x 50	-O		5DH1	35.6	38.6	193	154	2421	2250	117	7.75
3 x 70	-O		5DH1	39.7	42.7	214	171	3289	3150	145	10.85
3 x 1.5	-J		5DH1	9.4	10.4	42	31	137	67.5	13	0.23
3 x 2.5	-J		5DH1	10.9	12.5	63	50	197	112.5	17	0.39
3 x 4	-J		5DH1	12.5	14.1	71	56	269	180	24	0.62
4 x 1.5	-J		5DH1	10.1	11.7	47	35	157	90	13	0.23
4 x 2.5	-J	20180136	5DH1	12	13.6	68	54	235	150	17	0.39
4 x 4	-J		5DH1	14.2	15.8	79	63	335	240	24	0.62
4 x 6	-J		5DH1	15.5	17.5	88	70	428	360	31	0.93
4 x 10	-J	20180135	5DH1	20.9	22.9	115	92	746	600	43	1.55
4 x 16	-J	20160190	5DH1	24.5	27.5	138	110	1124	960	57	2.48
4 x 25	-J	20162061	5DH1	29.9	32.9	165	132	1668	1500	76	3.88
4 x 35	-J		5DH1	33.6	36.6	183	146	2184	2100	94	5.43
4 x 50	-J		5DH1	39.5	42.5	213	170	3034	3000	117	7.75
4 x 70	-J		5DH1	43.5	46.5	233	186	3975	4200	145	10.85

The values are valid for a multicore cable or three singlecore cables in trefoil in permanent operation with DC or AC with 50 up to 60 Hz at 110 °C ambient temperature, touching a surface, three cores loaded
-O = without green/yellow core, -J = with green/yellow core

HYDROFIRM
TGSH2G

Application
HYDROFIRM rubber-sheathed cables TGSH2G are intended for connection of electrical equipment in hot water and for medium mechanical stresses. These cables are also suitable for use in industrial water, cooling water, surface water, rainwater, groundwater and seawater (salt water) up to 2000 m water depth. When corrosive water is involved, or water of some other special compositions must be investigated in each individual case. These cables can be used indoors, outdoors, in industrial and agricultural plant. Use in workshops having an explosive atmosphere.When a cable is to be used in the presence of explosive or flammable atmospheres, guidance should be sought by reference to EN 60079 series of specifications and guidance should be sought in selecting suitable cables. For protected, fixed installation within equipment, pipes or wells, as well as for rotor connections, these cables may be operated with an AC voltage to 1000 V or a DC voltage to 750 V with respect to earth. The permissible AC voltage for motor tests is 3 kV for a maximum duration of 3 minutes.
In other respects the specifications of DIN EN 50565-2 apply.

Global data

Brand	HYDROFIRM
Type designation	TGSH2G
Standard	Based on EN 50525-2-21

Notes on installation

Maximum Submersing Depth	2000 Meter

Design features

Conductor	Copper, tinned, finely stranded, class 5 according to DIN EN 60228 / IEC 60228
Insulation	Ozone, weather, heat and water resistant insulation compound, base SIR
Color code	up to 5 cores: colored in accordance with DIN VDE 0293-308
Outer sheath	Ozone, weather, heat, and water resistant special compound, base SIR
Outer Sheath Colour	Black

Electrical parameters

Rated voltage	450/750V
Max. permissible operating voltage AC	0.476/0.825 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC test voltage	2.5 kV
Duration of AC test voltage	15 min.

Chemical parameters

Water resistance	DIN EN 50525-2-21

Thermal parameters

Max. short circuit temperature of the conductor	350 °C (max. 5 s)
Max. permissible water temperature	120 °C (At higher water temperatures, a shortened cable service life is to be expected)
Ambient temperature for fix installation min.	-50 °C
Ambient temp. in fully flex. operation min.	-50 °C

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permis-sible tensile force max. N	Current carrying capacity (1) A	Short Circuit Current (conduc-tor) kA
3 x 25	-O		5DH1	27	30	150	120	1352	1125	93	3.65
1 x 10	-O		5DH1	9.8	11	44	33	173	150	55	1.46
3 x 16	-O		5DH1	23.6	25.6	128	102	968	720	70	2.34
1 x 6	-O		5DH1	8.2	8.9	36	27	116	90	39	0.88
3 x 10	-O		5DH1	19.8	21.8	109	87	665	450	53	1.46
1 x 1.5	-O		5DH1	5.7	6.4	19	19	50	23	17	0.22
3 x 6	-O		5DH1	14	15.6	78	62	334	270	38	0.88
1 x 50	-O		5DH1	17	18.5	93	74	670	750	150	7.3
3 x 4	-O		5DH1	12.5	14.1	71	56	252	180	29	0.58
1 x 35	-O		5DH1	14.9	16.4	82	66	485	525	120	5.11
3 x 2.5	-O		5DH1	10.9	12.5	63	50	187	113	21	0.37
1 x 25	-O		5DH1	13.2	14.4	72	58	375	375	97	3.65
3 x 1.5	-O		5DH1	9.4	10.4	42	31	130	68	16	0.22
1 x 16	-O		5DH1	11.5	12.7	64	51	265	240	73	2.34
1 x 70	-O		5DH1	18.6	20.1	101	80	859	1050	185	10.22
4 x 2.5	-J		5DH1	12	13.6	68	54	235	150	21	0.37
4 x 1.5	-J		5DH1	10.1	11.7	47	35	157	90	16	0.22
3 x 4	-J		5DH1	12.5	14.1	71	56	269	180	29	0.58
3 x 2.5	-J		5DH1	10.9	12.5	63	50	197	113	21	0.37
3 x 1.5	-J		5DH1	9.4	10.4	42	31	137	68	16	0.22
3 x 70	-O		5DH1	39.7	42.7	214	171	3289	3150	178	10.22
3 x 50	-O		5DH1	35.6	38.6	193	154	2421	2250	143	7.3
3 x 35	-O		5DH1	30.5	33.5	168	134	1707	1575	115	5.11
4 x 50	-J		5DH1	39.5	42.5	213	170	3034	3000	143	7.3
4 x 70	-J		5DH1	43.5	46.5	233	186	3975	4200	178	10.22
4 x 25	-J		5DH1	29.9	32.9	165	132	1668	1500	93	3.65
4 x 35	-J		5DH1	33.6	36.6	183	146	2184	2100	115	5.11
4 x 10	-J		5DH1	20.9	22.9	115	92	746	600	53	1.46
4 x 16	-J	20162333	5DH1	24.5	27.5	138	110	1124	960	70	2.34
4 x 4	-J		5DH1	14.2	15.8	79	63	335	240	29	0.58
4 x 6	-J		5DH1	15.5	17.5	88	70	428	360	38	0.88

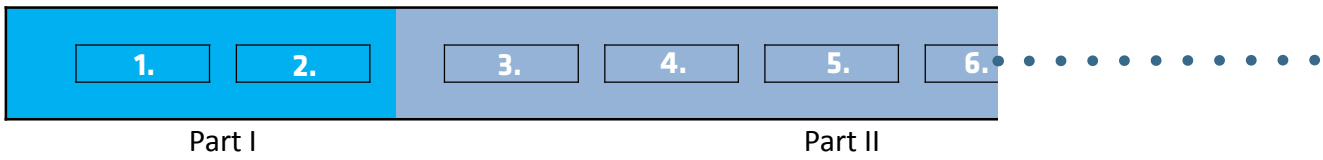
-O = without green/yellow core, -J = with green/yellow core
The values are valid for a multicore cable or three singlecore cables in trefoil in permanent operation with DC or AC with 50 up to 60 Hz at 120 °C ambient temperature, touching a surface, three cores loaded

Industry cables

TECHNICAL ANNEX

Industry cables

Code acc. to VDE 0292 for cables acc. to EN50525



1. Code of identification

A	National approved
H	Harmonised type
CH-N	Different national type
S	Special

2. Voltage Class

01	100 V
03	300 V / 300 V
05	300 V / 500 V
07	450 V / 750 V

3. Conductor insulation

B	Ethylen-Propylen-Rubber
G	Ethylen-Vinylacetat-Copolymer
M	Mineral
N	Chloropren-Rubber
N2	Chloropren-Rubber for welding cable
R	Natural- and Composition-Rubber
S	Silicone-Rubber, +180°C
T	Textile, inner covering
T6	Textile, core covering
V	Polyvinylchlorid (PVC), +70°C
V2	PVC, heat resistant, +90°C
V3	PVC, cold resistant, -25°C
V4	PVC, cross-linked
V5	PVC, oil resistant
Z	Thermoplast of Polyolefines, cross-linkes
Z1	Thermoplast of Polyolefines

4. Set-up Elements (optional)

C	Screen
Q4	additional Polyamid cover
T	Textile, inner covering
T6	Textile, core covering
H	flat, multiway
H2	flat, duocore

5. Cover insulation

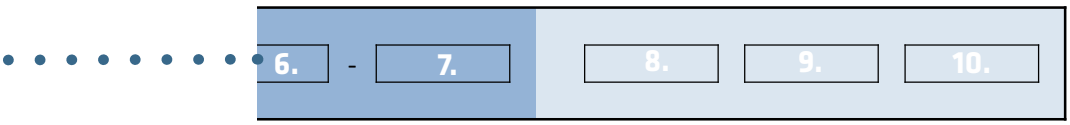
B	Ethylen-Propylen-Rubber
G	Ethylen-Vinylacetat-Copolymer
J	Fiber Glas reinforcement
M	Mineral
N	Chloropren-Rubber
N2	Chloropren-Rubber for welding cable HD 22.6
N4	Chloropren-Rubber, heat resistant
Q	Polyurethan
R	Natural- and Composition-Rubber
S	Silicone-Rubber, +180°C
T	Textile, inner covering
T2	Textile, flame resistant covering
T6	Textile, core covering
V	Polyvinylchlorid (PVC), +70°C
V2	PVC, heat resistant, +90°C
V3	PVC, cold resistant, -25°C
V4	PVC, cross-linked
V5	PVC, oil resistant
Z	Thermoplast of Polyolefines, cross-linkes
Z1	Thermoplast of Polyolefines

6. Set-up Form (optional)

D3	Strain Relief
D5	Center Filler (no carrying element)
FM	Communication core in LV cable
H	Flat, multiway
H2	Flat, multiway, duocore
H6	Flat, multicore
H7	Conductor insulation bilayer
H8	Coiled cord

6. Conductor Material

	Copper (no sign)
A	Aluminium



Part III

7. Conductor Type

D	Finely stranded conductor for welding application HD 22.6
E	Very finely stranded conductor for welding application HD 22.6
F	Finely stranded conductor, flexible application
H	Very finely stranded conductor
K	Finely stranded conductor, fixed installation
R	Multi conductor, round
U	Single conductor, round
Ö	Oil resistant

8. Cores

fig.	Number of cores

9. Protectiv Conductor

G	Green-yellow
X	No green-yellow

10. Cross section

fig.	in mm²

Fire Testing Methods

Flame retardance of a single cable is tested in accordance with IEC 60332-1. It is performed on a 60 cm cable sample with a gas flame for 1-4 min depending on the cable diameter. The cable has to be self-extinguishing within certain limits to fulfil the test. Please see figure 1.

Fire retardance is tested on bunched cables in accordance with IEC 60332-3, simulating the fire behaviour of the cables installed in a bunch. The main category that is used is A. This is based on an amount of 7 litres of combustible material per metre.

The bunch of cables has to be minimum 3.5 m high when it is in a burning chamber subjected to fire from a burner directed at the cables for fourty minutes. The cable bunch may not burn more than 2.5 m above the burner. Please see figure 2.

Smoke density is tested according to IEC 61034-1 (apparatus) and IEC 61034-2 (procedure and requirements). It is done by placing cable in a "smoke cube" (3x3x3 m). When the cable is burning, the light transmittance is measured using a photometric system. This test is aimed at simulating visibility when cables are burning on board a ship 60 % (70% for a single cable) visibility is satisfactory if it is attained throughout the test.

Halogens

To test whether a material is halogen free or not, the tests IEC 60754-1 and 60754-2 are used. The acidity of the gases from burning materials is measured. Being halogen-free means that the materials used in the cables do not contain any halogens – such as chlorine, bromine, iodine and fluorine. In order to attain the self-extinguishing effects that halogens have in cables, ATH based materials are used alternatively. The negative effects of halogens (corrosivity, toxicity etc.) are avoided.

Vertical flame propagation test

IEC 60332-1

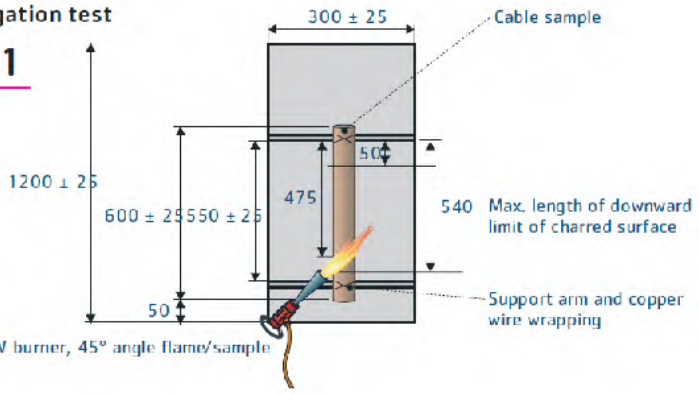


Figure 1.

Vertical flame spread of bunched cables

IEC 60332-3-22/-24 (Cat.C)

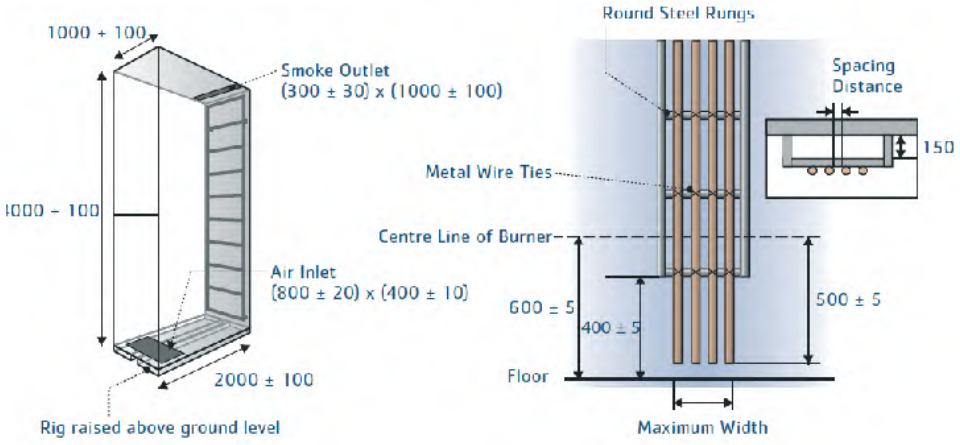


Figure 2.

Industry cables

Conductors

Conductors for flexible electric cables are designed according to DIN EN 60228 (VDE 0295). Nowadays, the conductors are made of copper (Cu). Aluminium and other materials have not found general acceptance. An overview of the common kinds of conductors is shown here:

Abbreviation	Designation	Specification/regulation
RE conductor	Circular, solid	DIN VDE 0295 Class 1
RM conductor	Circular, stranded	DIN VDE 0295 Class 2
RMV conductor	Circular, stranded, compacted	DIN VDE 0295 Class 2
F conductor	Finley stranded	DIN VDE 0295 Class 5
FS conductor	Very finely stranded	Prysmian specification
FF conductor	Extremely finely stranded	DIN VDE 0295 Class 6

In many countries, the design of the conductors according to DIN VDE 0295 is accepted. The regulation corresponds to EN 60228 and IEC 60228.

The conductor classes F, FS and FF are employed for flexible electric cables for mining applications. The conductor classes are divided into nominal cross-sections. The individual conductor classes F, FS and FF and the nominal cross-section are defined by specification of the maximum diameter of the single wires and by the maximum resistance of the conductor at 20 °C (see also the table below).

These flexible conductors are made of bare or tinned annealed copper. The conductors are constructed of many single wires, all of which must have the same diameter.

Nominal cross-section	Max. diameter of the single wires			Resistance of the conductor at 20 °C	
	mm			Ω/km	
	F	FS	FF		
mm²	conductor (Class 5)	conductor (Prysmian Group)	conductor (Class 6)	Bare single wires	Tinned single wires
0.5	0.21	0.16	0.16	39	40.1
0.75	0.21	0.16	0.16	26	26.7
1	0.21	0.16	0.16	19.5	20
1.5	0.26	0.21	0.16	13.3	13.7
2.5	0.26	0.21	0.16	7.98	8.21
4	0.31	0.26	0.16	4.95	5.09
6	0.31	0.26	0.21	3.30	3.39
10	0.41	0.26	0.21	1.91	1.95
16	0.41	0.31	0.21	1.21	1.24
25	0.41	0.31	0.21	0.780	0.795
35	0.41	0.31	0.21	0.554	0.565
50	0.41	0.36	0.31	0.386	0.393
70	0.51	0.36	0.31	0.272	0.277
95	0.51	0.41	0.31	0.206	0.210
120	0.51	0.41	0.31	0.161	0.164
150	0.51	0.41	0.31	0.129	0.132
185	0.51	0.41	0.41	0.106	0.108
240	0.51	0.41	0.41	0.0801	0.0817
300	0.51	0.41	0.41	0.0641	0.0654

Conductors

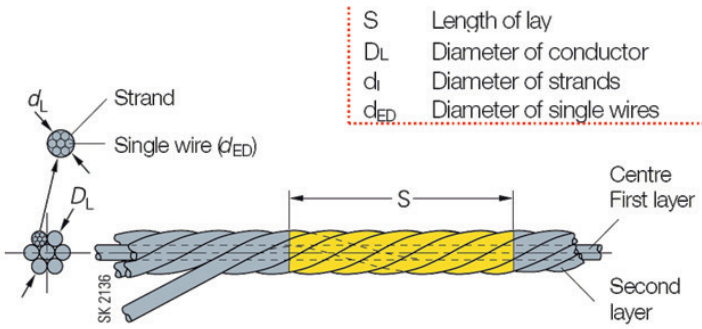
Voltage drop for DC powersupply and single phase systems at 20°C						
Nominal cross section	class 1 & class 2			class 5 & class 6		
	Annealed copper conductor		Conductor of aluminium or aluminium alloy	Annealed copper conductor		Conductor of aluminium or aluminium alloy
	Plain wires	Metal coated wires		Plain wires	Metal coated wires	
mm²	V/(A*km)	V/(A*km)	V/(A*km)	V/(A*km)	V/(A*km)	V/(A*km)
0.5	72.0	73.4	-	78.0	80.2	-
0.75	49.0	49.6	-	52.0	53.4	-
1	36.2	36.4	-	39.0	40.0	-
1.5	24.2	24.4	-	26.6	27.4	-
2.5	14.82	15.12	-	15.96	16.42	-
4	9.22	9.40	-	9.90	10.18	-
6	6.16	6.22	-	6.60	6.78	-
10	3.660	3.680	6.160	3.820	3.900	-
16	2.300	2.320	3.308	2.420	2.480	-
25	1.454	1.468	2.078	1.568	1.590	-
35	1.048	1.058	1.503	1.108	1.130	-
50	0.774	0.782	1.110	0.772	0.786	-
70	0.536	0.540	0.767	0.544	0.554	-
95	0.386	0.390	0.554	0.412	0.420	-
120	0.306	0.308	0.438	0.322	0.328	-
150	0.248	0.252	0.357	0.258	0.264	-
185	0.198	0.200	0.284	0.212	0.216	-
240	0.151	0.152	0.217	0.160	0.163	-

Voltage drop for 3-phase systems at 20°C						
Nominal cross section	class 1 & class 2			class 5 & class 6		
	Annealed copper conductor		Conductor of aluminium or aluminium alloy	Annealed copper conductor		Conductor of aluminium or aluminium alloy
	Plain wires	Metal coated wires		Plain wires	Metal coated wires	
mm²	V/(A*km)	V/(A*km)	V/(A*km)	V/(A*km)	V/(A*km)	V/(A*km)
0.5	62.35	63.57	-	67.55	69.46	-
0.75	42.44	42.95	-	45.03	46.25	-
1	31.35	31.52	-	33.77	34.64	-
1.5	20.96	21.13	-	23.04	23.73	-
2.5	12.83	13.09	-	13.82	14.22	-
4	7.98	8.14	-	8.57	8.82	-
6	5.33	5.39	-	5.72	5.87	-
10	3.17	3.19	5.33	3.31	3.38	-
16	1.992	2.009	3.308	2.096	2.148	-
25	1.259	1.271	2.078	1.358	1.377	-
35	0.908	0.916	1.503	0.960	0.979	-
50	0.670	0.677	1.110	0.669	0.681	-
70	0.4642	0.4677	0.7673	0.4711	0.4798	-
95	0.3343	0.3377	0.5543	0.3568	0.3637	-
120	0.2650	0.2667	0.4382	0.2789	0.2841	-
150	0.2148	0.2182	0.3568	0.2234	0.2286	-
185	0.1716	0.1732	0.2841	0.1836	0.1871	-
240	0.1306	0.1320	0.2165	0.1387	0.1415	-

Industry cables

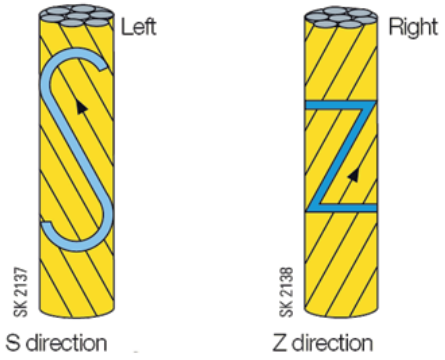
Conductors

The figure shows the design elements of a conductor for flexible electric cables for mining applications. Depending on the cross-section of the conductor, a flexible conductor consists of one or more strands which are laid up around a central strand in several layers. In the diagram, six individual strands (second layer) are laid up around a central strand (first layer). A third layer would then be made from 6 + 6 = 12 individual strands, arranged around the second layer.



The strands of the flexible conductors consist of many single wires bunched together. The single wires can be laid up (bunched) to the right or left, thus determining the direction of lay. This is shown in the figure as the Z direction of lay (right) or the S direction of lay (left).

This also applies to a conductor which is laid up of single strands.



The conductor design and the nominal cross-section of the flexible F, FS and FF conductors for flexible electric cables are usually as shows in the table.

Conductor design

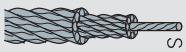
	Bunched	Stranded
F conductor	up to 10 mm²	from 16 mm²
FS conductor	up to 2.5 mm²	from 4 mm²
FF conductor	up to 2.5 mm²	from 4 mm²

Depending on the combination of the individual design elements of a conductor, there are three basic types of conductors (see table):

The main advantage of the **uniform-lay conductor** is its high flexibility. As a result of its design, the conductor also has a smaller diameter than other types of conductors. Disadvantages are its susceptibility to torsional loads (unstable) and its poor resistance to axial compression and sharp bending.

The **alternating-lay conductor** is very stable with respect to torsional loads and is not sensitive to axial compression and sharp bending. A disadvantage is its relatively low flexibility. As a result of its design the many crossing points of the single wires cause a lot of friction, which can lead to early breaking of the conductor, as compared to the other two types of conductors. The alternating-lay conductor has the largest diameter compared to the other two types of conductors.

The design of the **opposite-lay conductor** best meets the requirements of flexible electric cables for mining applications. It combines the advantages of both the uniform-lay conductor and the alternating-lay conductor without any of their disadvantages. The conductor is highly flexible, remains stable with respect to torsional loads and exhibits high axial compession and sharp bending strength. It has proven its excellent characteristics in many years of practice.

Types of conductor				
Uniform-lay conductor		Design	Strand	Layer
		Centre	Z	
		2nd layer	Z	Z
		3rd layer	Z	Z
Alternating-lay conductor		Design	Strand	Layer
		Centre	Z	
		2nd layer	S	Z
		3rd layer	Z	S
Opposite-lay conductor		Design	Strand	Layer
		Centre	S	
		2nd layer	S	Z
		3rd layer	S	Z

Compounds

Insulating and sheathing compounds

The table below gives an overview of all common compounds used for flexible electric cables. A basic distinction is made between thermoplastics and elastomers:

Thermoplastics, generally known as plastic, are usually **not cross-linked**
Elastomers, generally known as rubber, are always **cross-linked**

Serial No.	Material	Abbreviation	Type designation	
			VDE	Harm.
Thermoplastics				
1	Polyvinyl chloride	PVC	Y	V
2	Cross-linked polyvinyl chloride	PVC	X	V4
3	Polyethylene	PE	2Y	E
4	Cross-linked polyethylene	XLPE	2X	X
5	Low-pressure polyethylene	PE	2Yn	E2
6	Foam polyethylene	PE	02Y	
7	Polystyrene	PS	3Y	Q3
8	Polyamide	PA	4Y	Q4
9	Polyetrafluor ethylene	PTFE	5Y	E4
10	Perfluor ethylene propylene	PEP	6Y	E5
11	Ethylene tetrafluor ethylene	ETFE	7Y	E6
12	Polyimide	PI	8Y	Q5
13	Polypropylene	PP	9Y	E7
14	Polyvinylidene fluoride	PVDF	10Y	Q6
15	Polyurethane	TPU/PU	11Y	Q
16	Polyterephthalic acid ester	PETP	12Y	Q2
17	Polyester thermoplastic		13Y	
18	Perfluor ethylene oxyalkane	PFA	14Y	
19	Polychlorotrifluor ethylene	ECTFE	15Y	
Elastomers				
20	Natural rubber	NR	G	R
21	Synthetic rubber	SR	G	R
22	Styrene-butadiene rubber	SBR	G	R
23	Silicon rubber	SIR	2G	S
24	Isobuthylene-isoprene rubber	IIR	3G	B3
25	Ethylene-propylene rubber	EPR/EPDM	3G	B
26	Ethylene vinylacetate	EVA	4G	G
27	Chloroprene rubber	CR	5G	N
28	Chlorosulfonated polyethylene	CSM	6G	N4
29	Fluor elastomers		7G	
30	Nitrile butadiene rubber	NBR	8G	N5
31	Chlorated polyethylene	CM/CPE	9G	

Notes

Y: Type designation for a thermoplastic material

G: Type designation for an elastomeric material

X: Type designation for a cross-linked thermoplastic material (the letter „X“ replaces the „Y“ in „2X“ for cross-linked polyethylene)

0: Additional designation for foam materials (the zero is placed in front of the relevant type designation, e.g. „02Y“ for foamed PE)

Electrical parameters

Voltages

For the rated, operating and test voltages of cables, the definitions given in DIN VDE 0298, Part 3, apply. Some of these are mentioned in the table below.
AC = Alternating Current
DC = Direct Current

Rated voltage

The rated voltage of an insulated electric cable is the voltage which is used as the basis for the design and the testing of the cable with regard to its electrical characteristics.
The rated voltage is expressed by the two values of power frequency voltage U_o/U in V.
U_o = rms value between one conductor and „Earth“
U = rms value between two conductors of a multi-core cable or of a system of single-core cables

In a system with AC voltage, the rated voltage of a cable must be at least equal to the rated voltage of the system for which it is used. This requirement applies both to the value U_o and the value U.
In a system with DC voltage, its rated voltage must not be more than 1.5 times the value of the rated voltage of the cable.

Operating voltage

The operating voltage is the voltage applied between the conductors and earth of a power installation with respect to time and place with trouble-free operation.

- Cables with a rated voltage U_o/U up to 0.6/1 kV
  These cables are suitable for use in three-phase AC, single-phase AC and DC installations, the maximum continuously permissible operating voltage of which does not exceed the rated voltage of the cables by more than
  10% for cables with a rated voltage U_o/U up to and including 450/750 V
  20% for cables with a rated voltage U_o/U = 0.6/1 kV
- Cables with a rated voltage U_o/U greater than 0.6/1 kV
  These cables are suitable for use in three-phase and single-phase AC installations, the maximum operating voltage of which does not exceed the rated voltage of the cable by more than 20%
- Cables in DC installations
  If the cables are used in DC installations, the continuously permissible DC operating voltage between the conductors must not exceed 1.5 times the value of the permissible AC operating voltage.
  In single-phase earthed DC installations this value should be multiplied by a factor of 0.5.

Test voltage

Regarding the test voltage of flexible cables, the values given in the corresponding parts of cable standard apply. If the relevant shield is missing, as for example with OZOFLEX(PLUS) and HYDROFIRM cables, „core against core“ is tested in appropriate combinations. The values are to be regarded as AC test voltages (unless stated otherwise) for single-phase testing, i.e. the AC test voltage is applied between the core and the corresponding shielding (e.g. semiconductive layer, earth conductor, shield). Telecommunication cores (pairs) and other shielded pairs (e.g. (2x1)C) are tested „core against core“ and „core against shield“ whereby the test voltages are correspondingly different. With single-core cables without shielding, the corresponding opposite pole is a water bath.

Electrical parameters

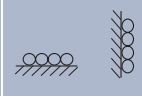
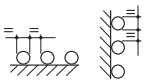
De-rating factors

The de-rating factors take into account the installation and operating conditions, such as temperature, grouping, intermittent periodic duty and the number of simultaneously loaded cores. They shall be used for determining the current-carrying capacity in accordance with the tables on page 128/129.

De-rating factors for varying ambient temperatures

Ambient temperature °C															
10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
1.15	1.12	1.08	1.04	1.0	0.96	0.91	0.87	0.82	0.76	0.71	0.65	0.58	0.50	0.41	0.29

De-rating factors for grouping

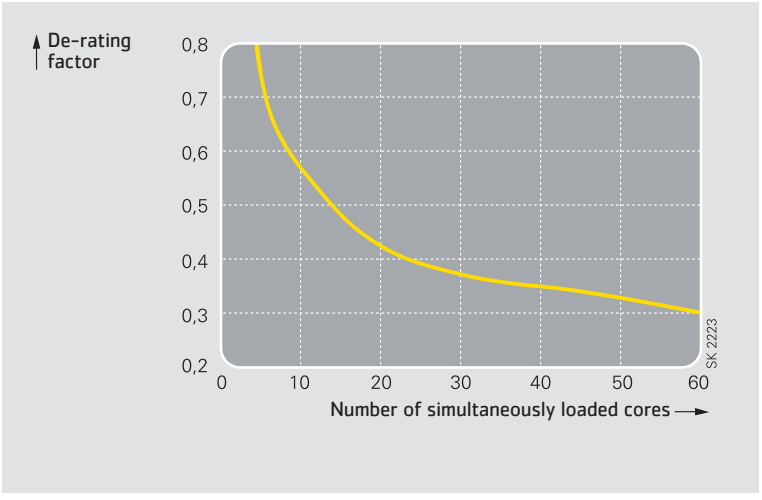
Arrangement		Number of multi-core cables or number of single or three-phase circuits made up of single-core cables (2 or 3 loaded conductors)													
		1	2	3	4	5	6	7	8	9	10	12	14	16	18	20
Bunched directly at the wall, on the floor, in conduit or ducts, on or in the wall		1.0	0.8	0.7	0.65	0.6	0.57	0.54	0.52	0.5	0.48	0.45	0.43	0.41	0.39	0.38
Single layer on the wall or floor, touching		1.0	0.85	0.79	0.75	0.73	0.72	0.72	0.71	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Single layer on the wall or floor, spaced with a clearance of 1 x cable diameter between adjacent cables		1.0	0.94	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Single layer under ceiling, touching		0.95	0.81	0.72	0.68	0.66	0.64	0.63	0.62	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Single layer under ceiling, spaced with a clearance of 1 x cable diameter between adjacent cables		0.95	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85

De-rating factors for intermittent periodic duty

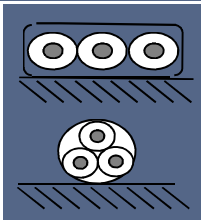
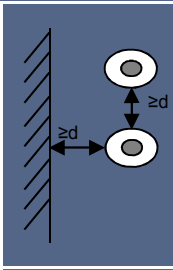
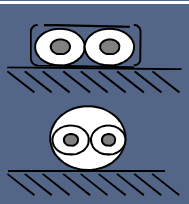
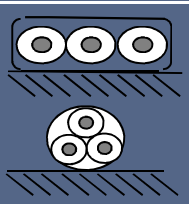
Ambient temperature	30°C	Nominal cross-section	Duty factor ED %			
		mm²	60	40	25	15
Duty cycle	10 min	0.75	1.00	1.00	1.00	1.00
		1	1.00	1.00	1.00	1.00
		1.5	1.00	1.00	1.00	1.00
		2.5	1.00	1.00	1.04	1.07
		4	1.00	1.03	1.05	1.19
		6	1.00	1.04	1.13	1.27
		10	1.03	1.09	1.21	1.44
		16	1.07	1.16	1.34	1.62
		25	1.10	1.23	1.46	1.79
		35	1.13	1.28	1.53	1.90
		50	1.16	1.34	1.62	2.03
		70	1.18	1.38	1.69	2.13
		95	1.20	1.42	1.74	2.21
		120	1.21	1.44	1.78	2.26
		150	1.22	1.46	1.81	2.30
		185	1.23	1.48	1.82	2.32
		240	1.23	1.49	1.85	2.36
		300	1.23	1.50	1.87	2.39

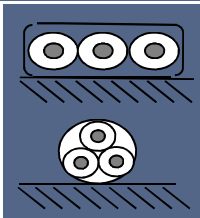
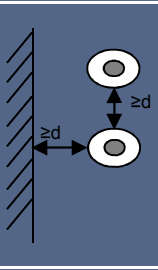
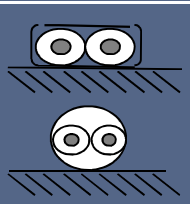
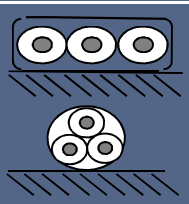
De-rating factors for multi-core cables with conductor cross-sections up to 10mm²

Number of loaded cores	De-rating factors
5	0.75
7	0.65
10	0.55
12	0.53
14	0.50
18	0.44
19	0.45
24	0.40
30	0.37
36	0.36
40	0.35
42	0.35
61	0.30



Electrical parameters

Current Carrying Capacity in ampere for EPR isolated cables with cupper core and max. permissible temperature at conductors of 60°C				
Ambient temperature: 30 °C; Installation in air				
Installation type	 at or on surfaces		 at or on surfaces (handsets)	 at or on surfaces (handsets)
Number of loaded cores	2 or 3	1	2	3
mm²				
0,5			3	3
0,75	12	15	6	6
1	15	19	10	10
1,5	18	24	16	16
2,5	26	32	25	20
4	34	42	32	25
6	44	54	40	
10	61	73	63	
16	82	98		
25	108	129		
35	135	158		
50	168	198		
70	207	245		
95	250	292		
120	292	344		
150	335	391		
185	382	448		
240	453	528		
300	523	608		
400		726		
500		830		

Current Carrying Capacity in ampere for VPE and EPR isolated cables with copper core and max. permissible temperature at conductors of 90°C				
Ambient temperature: 30 °C; Installation in air				
Installation type	 at or on surfaces		 at or on surfaces (handsets)	 at or on surfaces (handsets)
Number of loaded cores	2 or 3	1	2	3
mm²				
1,5	18	24	16	16
2,5	26	32	25	20
4	34	42	32	25
6	44	54	40	
10	61	73	63	
16	82	98		
25	108	129		
35	135	158		
50	168	198		
70	207	245		
95	250	292		
120	292	344		
150	335	391		
185	382	448		
240	453	528		
300	523	608		
400		726		
500		830		

Industry cables

Electrical parameters

Current Carrying Capacity in ampere for MS PROTOFLEX EMV-FC 3GSEGCY 3.6/6 kV; max. permissible temperature at conductors of 90°C and frequency of 0 to 60 Hz; copper core					
Ambient temperature °C	30		40		20
Installation type	 free in air	 at or on surfaces	 free in air	 at or on surfaces	 in the ground
Construction	multicore	multicore	multicore	multicore	multicore
Number of loaded cores	3	3	3	3	3
mm²	A	A	A	A	A
25	147	140	134	127	151
35	178	169	162	154	181
50	213	202	194	185	213
70	265	252	242	230	261
95	322	306	294	279	312
120	370	352	338	321	355
150	420	399	383	364	399
185	481	457	439	417	451
240	566	538	517	491	523
300	648	616	592	562	590

For other ambient temperatures, the current-carrying capacities must be converted with the following factors:

for 30°C:	°C	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
	f	1.15	1.12	1.08	1.04	1.00	0.96	0.91	0.87	0.82	0.76	0.71	0.65	0.58	0.50	0.41

for 40°C:	°C	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
	f	1.26	1.22	1.18	1.14	1.10	1.05	1.00	0.95	0.89	0.84	0.77	0.71	0.63	0.55	0.45

Current Carrying Capacity in ampere for rubber cables for use in water (e.g. HYDROFIRM, OZOFLEX (PLUS), PROTOMONT, PROTOLON, TECWATER; with and without screen); max. permissible temperature at conductors of 90°C and frequency of 0 to 60 Hz; ambient temperature 30°C												
Installation type	at or on surfaces		free		at or on surfaces		free		at or on surfaces		free	
	in air	in water	in air	in water	in air	in water	in air	in water	in air	in water	in air	in water
Construction	multicore				single core							
Number of loaded cores	3		3		1		1		3x1 bundled		3x1 bundled	
Arrangement												
mm²	A	A	A	A	A	A	A	A	A	A	A	A
0.5	*11*	13	*12*	14	*15*	18	*16*	19	*11*	14	*12*	15
0.75	*15*	18	*16*	19	*20*	24	*21*	26	*16*	19	*16*	20
1	*18*	22	*19*	23	*24*	29	*26*	31	*19*	23	*20*	24
1.5	*23*	28	*24*	29	*31*	38	*33*	40	*24*	29	*25*	30
2.5	30	36	32	38	41	49	43	52	31	38	33	40
4	41	49	43	52	56	67	59	70	43	51	45	54
6	53	64	56	67	72	86	76	91	55	66	58	70
10	74	89	78	93	101	121	106	127	77	93	81	98
16	99	119	104	125	135	162	142	170	103	124	109	131
25	131	157	138	165	178	214	188	225	137	164	144	173
35	162	194	171	205	220	264	232	278	169	203	178	214
50	202	242	213	255	275	330	289	347	211	253	222	266
70	250	300	263	316	340	408	358	429	261	313	275	330
95	301	361	317	380	409	491	431	517	314	377	331	397
120	352	422	371	445	479	574	504	605	367	441	387	464
150	404	485	425	510	549	659	578	694	422	506	444	533
185	461	553	485	582	627	752	660	792	481	577	507	608
240	*547*	656	*576*	691	*744*	893	*783*	940	*571*	685	*601*	721
300	*633*	760	*666*	800	*861*	1033	*906*	1087	*661*	793	*696*	835
400	*730*	876	*768*	922	*993*	1191	*1045*	1254	*762*	914	*802*	963
500	*840*	1008	*884*	1061	*1142*	1371	*1203*	1443	*877*	1052	*923*	1108

The italic figures were detected graphically.

The capacity in water is valid for complete immersed cables; it was fixed with 20% over the capacity in air.

For other ambient temperatures, the current-carrying capacities must be converted with the following factors:

°C	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
f	1.15	1.12	1.08	1.04	1.00	0.96	0.91	0.87	0.82	0.76	0.71	0.65	0.58	0.50	0.41

Electrical parameters

Allocation of cable rated voltages to the highest voltages of a system, test voltage and test duration							
Cable rated voltage	Max. permitted operating voltage of a system for				Test voltage		Test duration
	AC	Three-phase current	DC	DC	AC	DC	minimum
Uo/U	Line-Earth	Line-Line	Line-Earth	Line-Line			
V	V	V	V	V	kV	kV	min
100/100	110	110	165	165	1	-	15
230/400	254	440	330	660	2	-	5
300/300	-	-	-	-	2	-	15
300/500	318	550	413	825	2	-	15
450/750	476	825	619	1238	2.5	-	15
kV	kV	kV	kV	kV	kV	kV	min
0.6/1	0.7	1.2	0.9	1.8	2.5	-	5
1.8/3	2.1	3.6	2.7	5.4	6.0	-	
3.6/6	4.2	7.2	5.4	10.8	11.0	27.5	
6/10	6.9	12	9	18	17.0	42.5	
8.7/15	10.4	18	13.5	27	24.0	60.0	
12/20	13.9	24	18	36	29.0	72.5	
14/25	17.3	30	22.5	45	36.0	90.0	
18/30	20.8	36	27	54	43.0	107.5	
20/35	24.2	42	31.	63	50.0	125.0	

Permissible short-circuit current at max. permissible short-circuit temperatures of the conductor surface and for a fault duration t_{kr} = 1 s

EMC-Criteria

Electromagnetic compatibility

Electromagnetic compatibility is the capability of an electrical or electronic device to function correctly in its electromagnetic environment and not to cause interference to the environment to an impermissible degree. This matter is of immediate concern for all those engaged in planning and manufacturing electrical equipment and installations. On the one hand, the EMC legislation introduced in Germany from 1st January 1996, and, on the other hand, the high processing speed and transmission rates of modern electronics necessitate increased attention being paid to the question of the influence of transmitted and received interference. Non-observance of the currently valid EMC standards can lead to imposition of fines.

Standards

Standards, which directly address the question of cable construction or cable characteristics, do not exist. Whether a cable causes interference or not, is solely dependent on the manner in which it is used. From the point of view of the user, those standards, which specify limit values for permissible levels of interference, are relevant. These refer to equipment, plants or other electrical installations and thus refer indirectly to the cables. Those responsible for erection or manufacture thereof must confirm or prove that their equipment meets the EMC requirements. The currently vaiid standards and regulations, which are important for use of insulated cables, are listed in the figure on the next page.

Criteria for EMC cable selection

Selection of the most suitable cable and application/connection at site from the point of view of EMC can be carried out employing the criteria listed below:

- Use of a cable shield with low transfer impedance
- Symmetrical design and operation of the cable
- Choice of suitable materials by reason of the higher voltage
- Stress of the insulation by reflections at frequencies above 100 MHz; low loss figure
- Large clearance between the interference source and the interference sink (power cables layed spatially separated from the data cables)
- Earthing at both ends and coaxial connection of the shield
- Use of filters
- Laying on earthed surfaces

The design of a cable is of decisive importance for the evaluation of EMC. The most commonly employed constructional designs of power and control cables regarding their EMC characteristics are listed in the figure on the next page.

Selection of EMC cables for applications on ships (Power cables)

In recent years, a new generation of high-speed switching transistors (IGBT) has been employed for converters for variable-speed motors. Use of such converters results in high rates of voltage rise and high-frequency harmonics. For this reason consequent interference must be taken into account. In order to counteract this interference, special measures are required for the power cables. We recommend the use of TECWATER EMV-FC cables resp. HYDROFIRM EMV-FC cables. As a result of an optimized design regarding shield, materials and geometry, this cable type fulfills all the requirements with respect to mechanical characteristics for cables and is also distinguished by superior shield characteristics.

EMC-Criteria

Consequently interference emission is reduced to an acceptable degree or even completely suppressed.

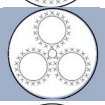
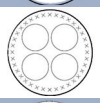
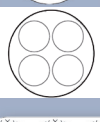
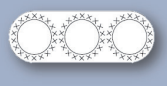
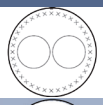
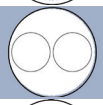
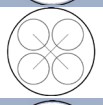
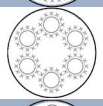
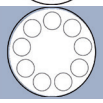
Moreover, the TECWATER EMV-FC cable design resp. HYDROFIRM EMV-FC cable design helps manufacturers and operators of electrical installations to maintain the limit values specified in the EMC legislation.

Standards and regulations relevant to EMC of cables

- **IEC 60801-3** This standard defines electromagnetic compatibility for instrumentation and control equipment for industrial process applications. It describes methods for evaluation of the susceptibility to electromagnetic interference. It further describes tests, by means of which the influence of electromagnetic interference from external sources on the operational behaviour of cables and their maximum achievable transmission rates can be determined.
- **IEC 60801-4** Tests based on this standard reveal the maximum loading limits of LAN cables as a result of uniform, random and periodic interference.
- **EN 55011 (DIN VDE 0875, Part 11)** In this standard the limit values and measuring procedures for radio frequency interference caused by industrial, scientific and medical high-frequency equipment (ISM devices) are defined.
- **EN 55022** This standard corresponds to DIN VDE 0878, Part 3: Limit values and measuring procedures for radio frequency interference caused by information processing equipment (ITE). The radiated energy of a cable can be measured in simulated operation. In addition, the limit value classes A and B for radio frequency interference voltages are defined.
- **Official Journal Regulation 243/1991** This regulation of the German Federal Ministry for Post and Telecommunication deals with radio frequency interference and interference voltage emission.

Information on this subject is also to be found in FTZ TL-6145-3000 issued by the Research and Technology Centre of the German Post Office.

Electrical parameters

Construction		Shield	EMC evaluation	
	Symmetrical 3 + 3	Cu braid (possibly with Cu fleece)	Optimum	EMC power cables
	Symmetrical 3-core	Cu braid (single core)	Good	
	Unsymmetrical 4-core	Cu braid (possibly with Cu fleece)	Good	
	Symmetrical 3 + 3	-	Satisfactory	
	Unsymmetrical 4-core	-	Mediocre	
	Unsymmetrical parallel cores or flat cable	Cu braid	Mediocre	
	Unsymmetrical parallel cores or flat cable	-	Poor	
Construction		Shield	EMC evaluation	
	Symmetrical 2-core	Cu braid (possibly with Cu fleece)	Optimum	EMC control cables
	Symmetrical 2-core	-	Very good	
	Symmetrical 4-core	-	Good (with symmetrical operation)	
	Unsymmetrical concentrically stranded	Cu braid overall shield	Often adequate (with adjacent cores	
	Unsymmetrical concentrically stranded	Cu braid individually shielded cores	Often adequate (with adjacent cores	
	Unsymmetrical concentrically stranded	-	Poor	

Shield

The shield is a „barrier“ against electromagnetic fields and protects electric signals against external interference. The aim is to weaken or stop unwanted signals to such an extent that the wanted data signals can be transmitted without interference in the endangered signalling conductor. There are three basic types of shield structure:

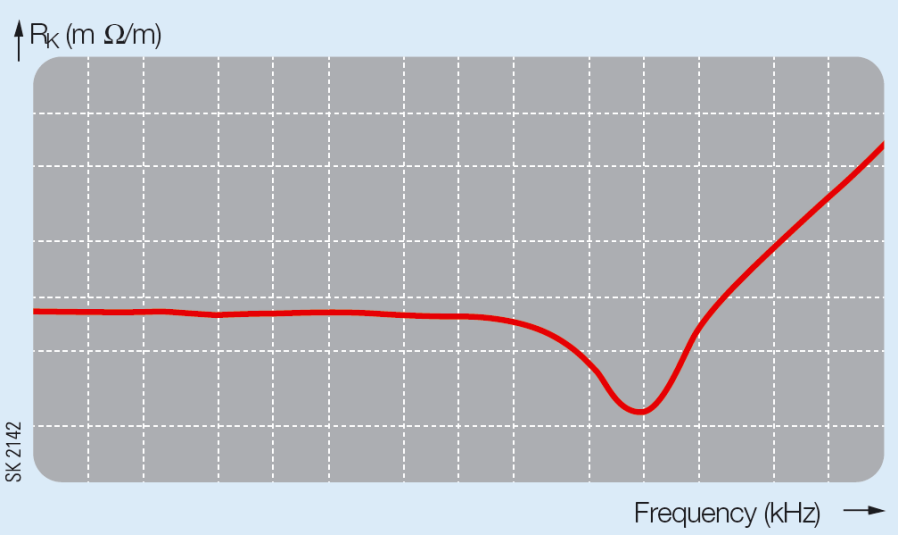
- Overall shield over several cores
- Shielded pairs
- Individually shielded cores.

An overall sheath over several cores, which as a rule is situated between the inner and outer sheath of a cable, has not found general acceptance for reeling cables, because as a result of frequent bending the tensile and pressure forces within the cable lead to premature destruction of the shields and to failure of the cable.

Shielded pairs and individually shielded cores, on the other hand, have proven themselves in practice and are successfully used in Prysmian Group cables.

Braided screens are characterized by their transfer impedance which is defined as the ratio of the voltage drop along the shield on the interfered side to the parasitic current on the other side. The transfer impedance R_K (DIN 40500) is given for a specific frequency in mΩ/m and is usually plotted with respect to frequency. The lower the transfer impedance of a shield, the better the screening effect. The transfer impedance of the braided screens usually used for flexible electric cables for mining applications is optimized at 30 MHz and is therefore focussed on data-processing quality.

A typical transfer impedance characteristic is shown in the diagram.



Chemical parameters

Chemical	Material				
	EPR	PVC	CSM	PCP	PU
Aceton					
Acetic acid, 30 %					
Aluminium chloride solution					
Aluminium sulfate solution					
Ammonia, analhydrous					
Ammonium chloride solution					
Ammonium hydroxide solution					
Ammonium sulfate solution					
Amyl acetate					
Aniline					
Asphalt					
Benzine					
Benzole					
Borax solution					
Boric acid solution					
Butyl acetate					
Calcium bisulphite solution					
Calcium chloride solution					
Calcium hydroxide solution					
Carbon disulphide					
Carbon tetrachloride					
Chlorobenzene					
Chloroacetic acid					
Chlorine gas, wet					
Chlorine gas, dry					
Chloroform					
Copper chloride solution					
Copper sulphate solution					
Cyclohexane					
Dibutylphtalate					
Diesel oils					
Ethyl acetate					
Ethyl alcohol					
Ethylene glycol					
Ethylen oxide					
Formaldehyde, 10 %					
Fuel oil					
Glycerine					
Hydraulic oils					
Hydrochloric acid, 20 %					
Hydrogen sulphide					
Kerosine					
Lactic acid					
Linseed oil					
Lubricating oils					

Chemical	Material				
	EPR	PVC	CSM	PCP	PU
Magnesium chloride solution					
Methanol					
Methyl chloride					
Methyl ethyl ketone					
Methyl alcohol					
Mineral oil					
Naphta					
Naphtalene					
Nitric acid, 10 %					
Perchlor ethylene					
Petroleum					
Phenol					
Phosphoric acid					
Picric acid					
Potassium chloride					
Pyridine					
Soap solution					
Sodium hydroxide, 25 %					
Sodium hypochloride					
Soya bean oil					
Sulphur					
Sulphurous acid					
Sulphuric acid < 50%					
Stearic acid					
Toluene					
Transformer oil					
Tributyl phosphate					
Trichlorethylene					
Triethanolamine					
Turpentine					
Vegetable oils and grease					
Water					
Xylene					
Zinc chloride solution					

- Resistant
- Limited resistance
- Non-resistant
- Not tested

Industry cables

Cable Drum Overview

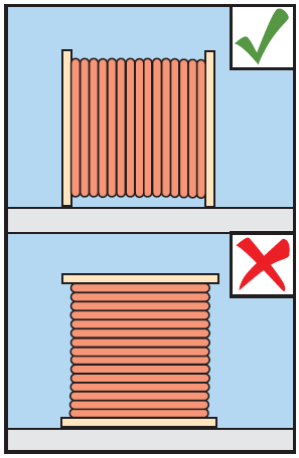
Drum size	Weight	Dimensions	Volume
	kg	Ø x width cm	m^3
051	9	50 x 46	0.09
071	23	71 x 48	0.19
081	28	80 x 52	0.26
091	45	90 x 70	0.45
101	68	100 x 89	0.70
121	132	125 x 89	1.09
141	159	140 x 89	1.37
161	247	160 x 100	2.01
181	296	180 x 110	2.80
200	487	200 x 135	4.24
220	653	224 x 138	5.44
250	759	250 x 148	7.26
281	1051	280 x 164	10.10
300	1240	300 x 176	12.14
230	1340	320 x 225	18.10
340	2600	340 x 225	20.43

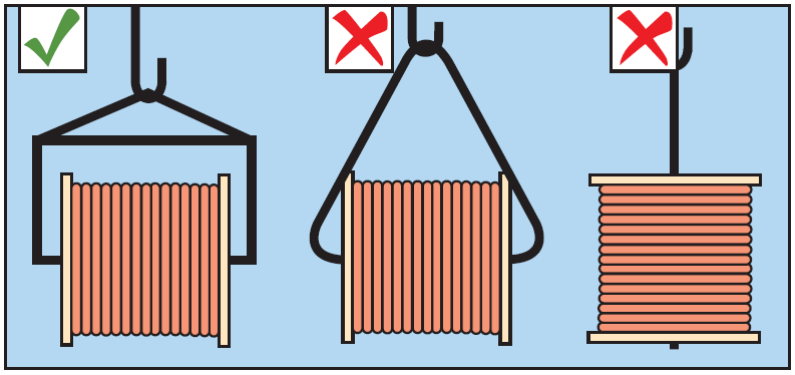
Comparison

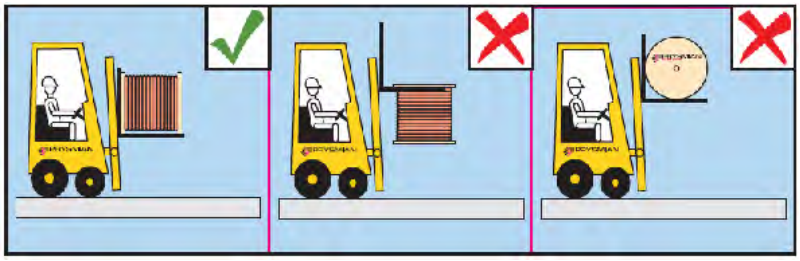
Cross section metrical mm²	mm²	AWG-Size (American Wire Gage)
0,75	0,653	19
	0,823	18
	1,04	17
	1,31	16
1,5	1,65	15
	2,08	14
	2,62	13
2,5	3,31	12
4,0	4,17	11
	5,26	10
	6,63	9
	8,37	8
6,0	10,55	7
10,0	13,30	6
	16,77	5
16,0	21,15	4
25,0	26,67	3
	33,63	2
35,0	42,41	1
	53,48	1/0
50,0	67,43	2/0
70,0	85,03	3/0
95,0	107,20	4/0
120,0	126,64	250 MCM
150,0	152,00	300 MCM
	177,35	350 MCM
185,0	202,71	400 MCM
240,0	253, 35	500 MCM
300,0	380,00	750 MCM
400,0		
500,0	506,71	1000 MCM

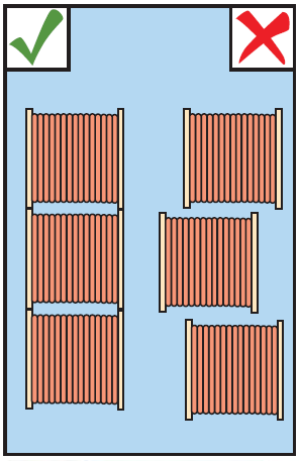
Industry cables

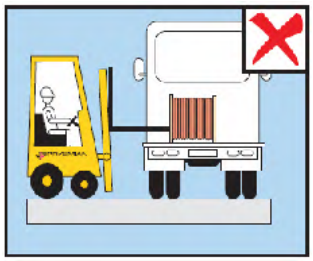
Drum Handling



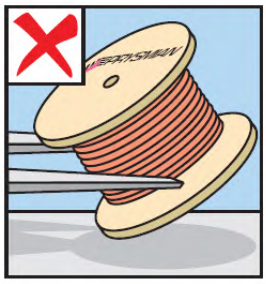


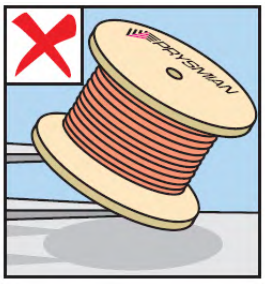


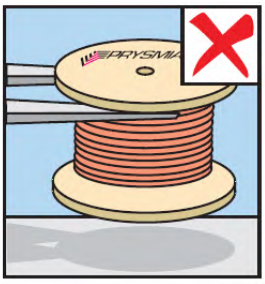




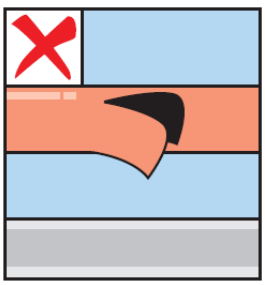
Do not use the fork lift tynes to push cable drums sideways on a truck tray or the ground as damage to the flanges can result in the drum being unacceptable to customers.





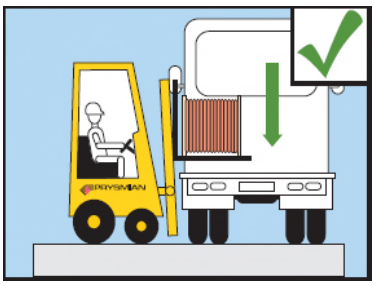


Do not attempt to lift drums of cable without inserting the fork lift tynes fully under both flanges as the tynes can damage the cable, making it unserviceable. Do not attempt to lift drums by the flange or to lift drums into the upright (correct) position by lifting the top flanges as it may break the flange from the drum barrel. The drum will then be undeliverable. Use a length of steel pipe through the centre of the drum to provide leverage and control.

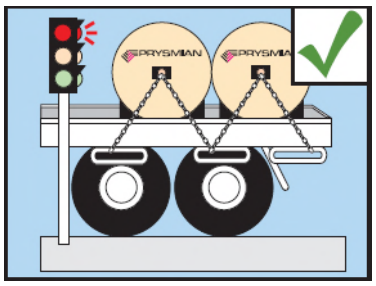


This cable has been rendered unserviceable through fork lift tyne damage and may necessitate the scrapping of the whole drum.

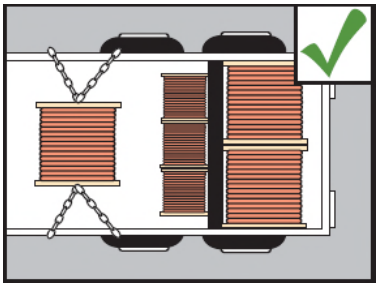
When rewinding cables, drums shall be of suitable construction and in good condition. All drums shall be held firmly in appropriate pay-off stands to prevent vibration and ensure smooth, even rotation to minimise inner end cable grow-out and tangling. Cables shall be wound evenly and uniformly, then secured.



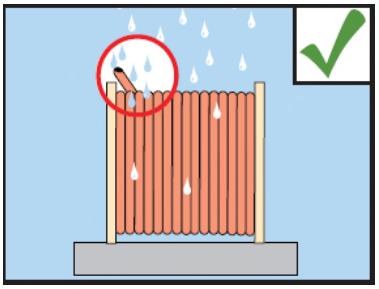
Lower drums gently onto the ground or transport.



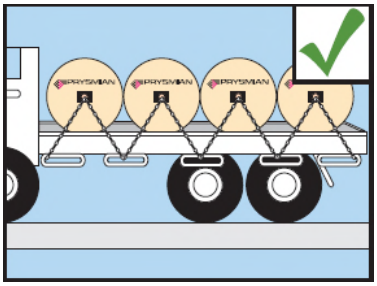
Ensure drums are restrained to restrict movement during sudden stop/starts.



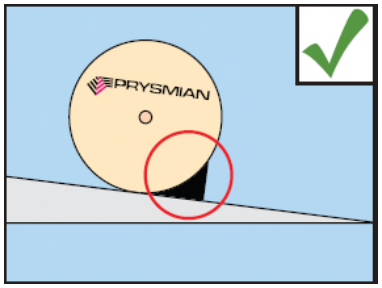
Always protect cable from rubbing or damage. Adjust load or use separators.



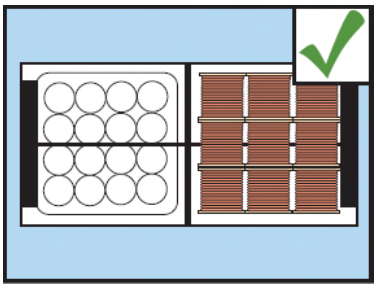
Ensure cable sealing is intact so moisture cannot seep into cable. Report damage.



Heavy drums should be chained appropriately for transit, with protection from the chain rubbers for the spindle hole in the centre of the drum. Under no circumstances are drums to be transported on their side.

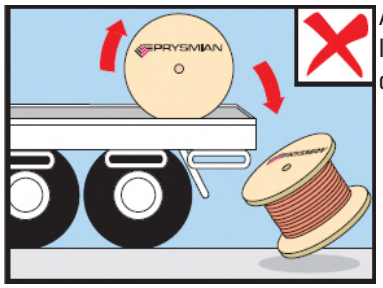


When placing drums on an uneven surface be prepared to check drums against rolling and chock is required.

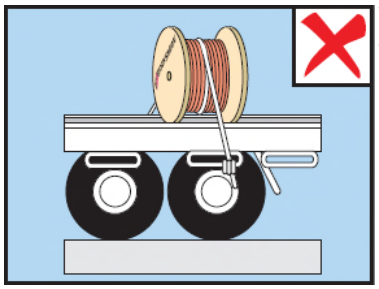


Always protect product, especially spools, against rope damage during tying down of load.

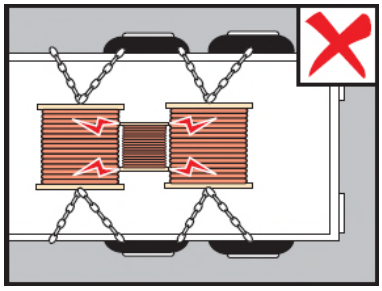
Drum Handling



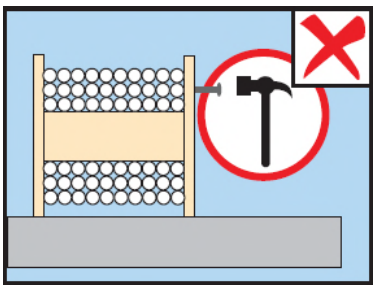
Avoid impact force loadings. Never drop drums.



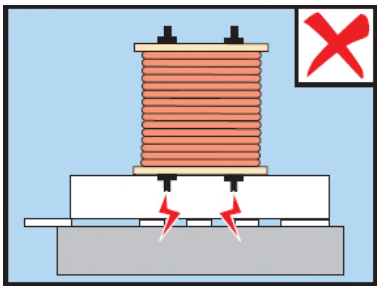
When securing drums for transit, do not place ropes or chains over cable as damage can occur to the outer insulation rendering the cable unserviceable.



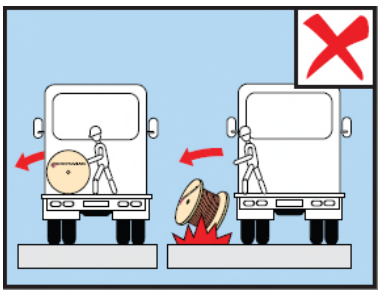
Never let drum flanges contact cable on adjacent drums.



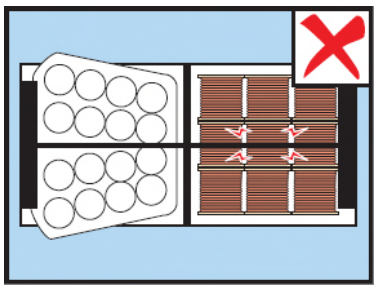
Avoid use of additional nails on drums or cable, because flange thickness vary.



Never lay drums on their side, even on top of pallets, as protruding bolts damage spools and cable.



Do not roll cable drums from the back of a delivery truck to the ground as with the resulting flange damage the cable will not be able to be rollded off the drum.

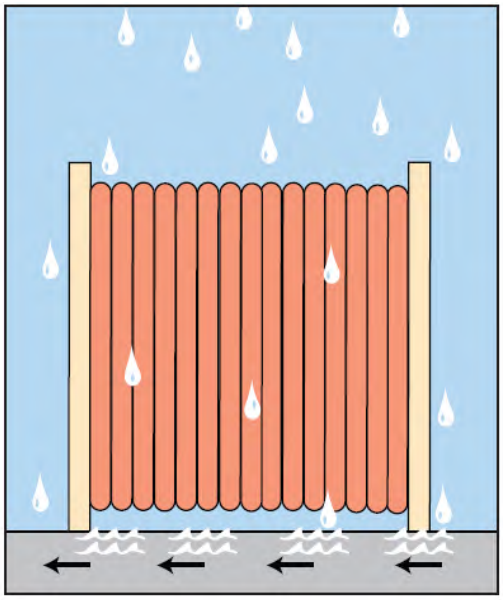


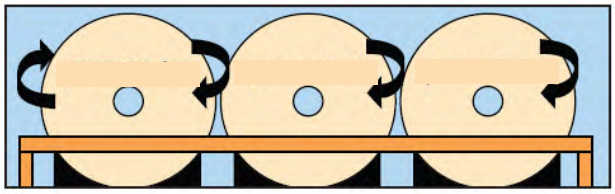
Never use rope directly over shrinkwrapped cable.

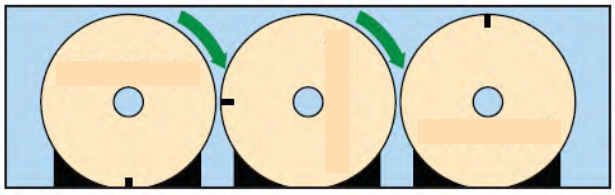
Storage Recommendations

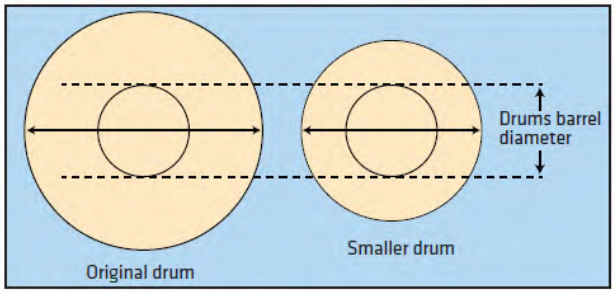
When storing cable drums for long periods, please take the following guidelines into consideration:

- Select a site for storage that is level and dry, preferably indoors with a concrete surface, with no risk of falling objects, chemical spills (oil, grease, etc.) open flames and excessive heat.
- If indoors, and concrete storage is not available, select a well-drained surface that will prevent the reel flanges sinking into it.
- The drums must always be stored with their flanges vertical.
- Leave enough space between stored drums for air circulation.
- If drums are stored in a high traffic area (fork lifts frequent transit) suitable barriers should be erected to prevent damage from moving equipment.
- The bolts should be tightened at regular intervals.
- During storage, the drums should be rolled to an angle of 90° every three months.
- When only a portion of the cable is used, the open end of the cable remaining on the drum should immediately be re-sealed to prevent the entrance of moisture. Once it has been re-sealed, the cut end should be fixed to the inside edge of the drum flange to prevent the end from extending beyond the flanges during drum movement.
- When it is required to rewind the cable on to another drum, always consider that the diameter of the new drum barrel should be at least the same size of the original drum barrel diameter.









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