

Halogen-free Special Rubber-insulated Cables

with increased heat resistance

with plain conductor

SIENOPYR(180) (N)HXSGAFHXÖ 3,6/6 kV
SIENOPYR(180) (N)HXSGAFCHXÖ 3,6/6 kV

Halogen-free cables are used for preventive fire protection in buildings, plants and installations where large numbers of people congregate and/or valuable equipment is located. The low smoke emission facilitates rescue and fire-fighting. Special insulating and sheathing compounds prevent fire from spreading along the cables. Non-corrosive gases do not cause secondary damage.

SIENOPYR^(R)-cables contribute considerably to both.

Application

These cables are intended for use in:

- rail vehicles to having fire protection grades 1 to 3 to DIN 5510. These cables may be employed both in- and outdoors, as long as they are out of hand's reach.

The outer cover serves to mechanically protect the insulation respectively the screen during installation. The outer cover does not offer protection against electric shock. Therefore precautionary measures must ensure that the unscreened cables are not normally accessible by hand during operation above 1000 V. The screen must be connected with earth potential.

The cable ends must be protected against the ingress of water.

- conduits which are either surface-mounted, embedded on or in or under plaster, or enclosed within electrical installation ducts or within equipment housings.
- switchgear and distribution boards up to 1000 V for unfused connections (DIN VDE 0100-520).

In other respects, DIN VDE 0298-3 applies.





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Technical details

Design

based on DIN VDE 0250 part 602

- finely stranded conductor of plain copper wires, class 5 according to DIN VDE 0295 and IEC 60228
- Insulation made of a halogen-free cross-linked SIR compound (Silicon rubber)
- Shielded versions feature tinned copper, braided wires
- Cover made of a halogen-free cross-linked SIR compound which provides mechanical protection during installation (Silicon rubber)

Color of the outer cover: yellow

Marking, e.g.:

SIENOPYR(180) (N)HXSGAFHXOE 25 3,6/6 kV

Temperatures

Maximum permissible operation temperature at conductor 20 000 h 180 °C

Maximum permissible short-circuit temperature at conductor max. 5 s 350 °C

Lowest permissible temperatures for operation, handling, installation, transport and storage
flexing -50 °C
fixed -50 °C

Current-carrying capacity

The values refer to a cable under continuous operation, the shown installation method, ambient temperature 30 °C

For other ambient temperatures, the current rating is to calculate by applying the following factors f:

°C	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
f	1.06	1.05	1.03	1.02	1.00	0.98	0.97	0.95	0.93	0.91	0.89	0.88	0.86	0.84	0.82	0.80	0.77	0.75	0.73

Special characteristics

- Burning behavior
Tested to DIN EN 50265-2-1 (VDE 0482 part 265-2-1)
- Halogen free
Tested to DIN EN 50267-2-2 (VDE 0482 part 267-2-2)
- Low smoke
Tested to DIN EN 50268-2 (VDE 0482 part 268-2)
- Oil resistant
Tested to DIN EN 60811-2-1 (VDE 0473 part 811-2-1)

Minimum bending radii

	without screen	with screen
Fixed installation	6 d	6 d
Free-flexing	10 d	20 d
Free-flexing in bogie e.g. between carriage and traction motor	8 d	8 d

d = max. outer diameter of cable

Continuous tensile stress

Max. 15 N/mm² refers to conductor's cross sectional area

Voltages

Rated voltage of cable (AC) U_0/U 3,6/6 kV

Maximum permissible operating voltage $U_{b,max}$

- single-phase and three-phase AC operation
line-earth / line-line 4,2/7,2 kV
- DC operation
line-earth / line-line 5,4/10,8 kV

AC test voltage (test duration) 11 kV (5 min.)



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Selection data

with plain conductor

Conductor rated cross-section mm ²	Order-No.	Conductor diameter (approx.) mm	Diameter over screen mm	Outer diameter of cable		Minimum bending radii			Net weight per 1000 m approx. kg	perm. short-circuit current (1 s) *) kA	Fire load kJ/m
				min.	max.	fixed installation mm	free-flexing mm	in bogie mm			

(N)HXSGAFHXÖ 3,6/6 kV (without screen)

4	5DF9 ...	2,5	-	9,1	9,8	59	98	78	113	0,53	1576
6	5DF9 ...	3,2	-	9,8	10,5	63	105	84	141	0,79	1762
10	5DF9 ...	4,1	-	10,6	11,8	71	118	94	191	1,32	2003
16	5DF9 ...	5,6	-	12,5	13,7	82	137	110	282	2,11	2601
25	5DF9 ...	6,8	-	14,2	15,4	92	154	123	391	3,30	3277
35	5DF9 ...	8,1	-	15,5	17,0	102	170	136	500	4,62	3676
50	5DF9 ...	9,6	-	17,0	18,5	111	185	148	650	6,60	4135
70	5DF9 ...	11,2	-	18,7	20,2	121	202	162	860	9,24	4625
95	5DF9 ...	13,2	-	21,0	22,5	135	225	180	1110	12,54	5740
120	5DF9 ...	14,9	-	23,2	24,7	148	247	198	1390	15,84	6670
150	5DF9 ...	16,6	-	24,7	26,9	161	269	215	1690	19,80	7257
185	5DF9 ...	18,0	-	26,4	28,6	172	286	229	1980	24,42	7741
240	5DF9 ...	21,2	-	29,8	32,0	192	320	256	2590	31,68	8847

(N)HXSGAFCHXÖ 3,6/6 kV (with screen)

4	5DF9 ...	2,5	8,5	10,2	11,4	68	228	91	153	0,53	1829
6	5DF9 ...	3,2	9,1	10,8	12,0	72	240	96	183	0,79	2021
10	5DF9 ...	4,1	10,1	11,8	13,0	78	260	104	233	1,32	2288
16	5DF9 ...	5,6	11,8	13,9	15,1	91	302	121	352	2,11	2956
25	5DF9 ...	6,8	13,7	15,5	17,0	102	340	136	470	3,30	3677
35	5DF9 ...	8,1	15,0	17,1	18,6	112	372	149	585	4,62	4101
50	5DF9 ...	9,6	16,5	18,7	20,2	121	404	162	835	6,60	4599
70	5DF9 ...	11,2	18,2	20,1	21,6	130	432	173	985	9,24	5111
95	5DF9 ...	13,2	20,5	22,4	23,9	143	478	191	1230	12,54	6247
120	5DF9 ...	14,9	22,4	24,6	26,8	161	536	214	1520	15,84	7265
150	5DF9 ...	16,6	24,1	26,1	28,3	170	566	226	1830	19,80	7886
185	5DF9 ...	18,0	25,8	27,8	30,0	180	600	240	2130	24,42	8431
240	5DF9 ...	21,2	29,4	31,2	33,4	200	668	267	2740	31,68	9646

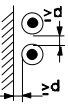


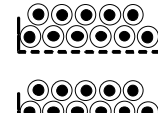
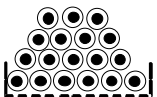
*) Permissible short-circuit currents I_{thz} for other break times t_k up to 5 s are calculated using the formula

$$I_{thz} = I_{thr} \sqrt{\frac{1s}{t_k}}$$



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 Current-carrying capacity

Continuous operation
 Maximum permissible operation temperature at conductor in °C : **180**
 Ambient temperature in °C : **30**

Installation	1. free in air or on perforated cable trays																											
	 																											
Number of simultaneously loaded cables	1	2	3	4	6	8	10	16	20	4	6	8	10	16	20	4	6	8	10	16	20	4	6	8	10	16	20	
Conversion factor	1	0,87	0,81	0,78	0,75	0,74	0,73	0,72	0,71	0,71	0,62	0,57	0,53	0,47	0,45	0,67	0,59	0,54	0,50	0,45	0,43	0,71	0,58	0,52	0,48	0,41	0,38	
Copper conductor nom. cross section mm ²	Current-carrying capacity in A																											
4	81	70	66	63	61	60	59	58	58	58	50	46	43	38	36	54	48	44	41	36	35	58	47	42	39	33	31	
6	103	90	83	80	77	76	75	74	73	73	64	59	55	48	46	69	61	56	52	46	44	73	60	54	49	42	39	
10	145	126	117	113	109	107	106	104	103	103	90	83	77	68	65	97	86	78	73	65	62	103	84	75	70	59	55	
16	196	171	159	153	147	145	143	141	139	139	122	112	104	92	88	131	116	106	98	88	84	139	114	102	94	80	74	
25	258	224	209	201	194	191	188	186	183	183	160	147	137	121	116	173	152	139	129	116	111	183	150	134	124	106	98	
35	321	279	260	250	241	238	234	231	228	228	199	183	170	151	144	215	189	173	161	144	138	228	186	167	154	132	122	
50	406	353	329	317	305	300	296	292	288	288	252	231	215	191	183	272	240	219	203	183	175	288	235	211	195	166	154	
70	511	445	414	399	383	378	373	368	363	363	317	291	271	240	230	342	301	276	256	230	220	363	296	266	245	210	194	
95	609	530	493	475	457	451	445	438	432	432	378	347	323	286	274	408	359	329	305	274	262	432	353	317	292	250	231	
120	717	624	581	559	538	531	523	516	509	509	445	409	380	337	323	480	423	387	359	323	308	509	416	373	344	294	272	
150	827	719	670	645	620	612	604	595	587	587	513	471	438	389	372	554	488	447	414	372	356	587	480	430	397	339	314	
185	941	819	762	734	706	696	687	678	668	668	583	536	499	442	423	630	555	508	471	423	405	668	546	489	452	386	358	
240	1129	982	914	881	847	835	824	813	802	802	700	644	598	531	508	756	666	610	565	508	485	802	655	587	542	463	429	



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 Current-carrying capacity

Continuous operation
 Maximum permissible operation temperature at conductor in °C : **180**
 Ambient temperature in °C : **30**

Installation	2. on a surface				3. under a surface (ceiling)								4. in a tube, channel or housing															
Number of simultaneously loaded cables	1	2	3	4	1	2	3	4	5	6	7	8	≥ 9	1	2	3	4	5	6	7	8	9	10	12	14	16	20	
Conversion factor	1	0,85	0,79	0,75	0,95	0,81	0,72	0,68	0,66	0,64	0,63	0,62	0,61	1	0,8	0,7	0,65	0,6	0,57	0,54	0,52	0,5	0,48	0,45	0,43	0,41	0,38	
Copper conductor nom. cross section mm ²	Current-carrying capacity in A																											
4	77	65	61	58	73	62	55	52	51	49	48	48	47	62	49	43	40	37	35	33	32	31	30	28	26	25	23	
6	98	83	77	73	93	79	70	67	65	63	62	61	60	78	63	55	51	47	45	42	41	39	38	35	34	32	30	
10	138	117	109	103	131	112	99	94	91	88	87	85	84	110	88	77	72	66	63	60	57	55	53	50	47	45	42	
16	186	158	147	140	177	151	134	127	123	119	117	115	114	149	119	104	97	89	85	80	77	74	72	67	64	61	57	
25	245	208	194	184	233	199	176	167	162	157	154	152	150	196	157	137	127	118	112	106	102	98	94	88	84	80	75	
35	305	259	241	229	290	247	220	207	201	195	192	189	186	244	195	171	159	146	139	132	127	122	117	110	105	100	93	
50	386	328	305	289	366	312	278	262	255	247	243	239	235	309	247	216	201	185	176	167	160	154	148	139	133	127	117	
70	485	413	384	364	461	393	350	330	320	311	306	301	296	388	311	272	252	233	221	210	202	194	186	175	167	159	148	
95	579	492	457	434	550	469	417	393	382	370	364	359	353	463	370	324	301	278	264	250	241	231	222	208	199	190	176	
120	681	579	538	511	647	552	490	463	450	436	429	422	416	545	436	381	354	327	311	294	283	272	262	245	234	223	207	
150	786	668	621	589	746	636	566	534	519	503	495	487	479	629	503	440	409	377	358	339	327	314	302	283	270	258	239	
185	894	760	706	670	849	724	644	608	590	572	563	554	545	715	572	501	465	429	408	386	372	358	343	322	308	293	272	
240	1073	912	847	804	1019	869	772	729	708	686	676	665	654	858	686	601	558	515	489	463	446	429	412	386	369	352	326	



Markenname Trade mark	Bauartkurzzeichen Type designation
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SIENOPYR(180)

(N) HX SGAF C HXÖ

25

3,6/6 kV

Sondertyp, in Anlehnung an die Norm
Special type, similar to the standard

Halogenfreie Isolierung, vernetzt
Halogen-free insulation, cross-linked

Bauart: Sonder-Gummiaderleitung
mit feindrähtigem Leiter
*Type: Special Rubber-insulated cable
with finely stranded copper conductor*

Kupferschirm
Copper screen

Halogenfreie Hülle, vernetzt, ölbeständig
Halogen-free sheath, cross-linked, oil resistant

Leiternennquerschnitt 25 mm²
Nominal cross-section

Nennspannung der Leitung (Wechselspannung) U_0/U
Rated AC-voltage of cable