

Halogen-free Special Rubber-insulated Cables

with increased heat resistance

with plain conductor

SIENOPYR(120) (N)HXSGAFHXÖ 3,6/6 kV
SIENOPYR(120) (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 4 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 EVA compound which provides mechanical protection during installation (Ethylen-vinylacetat-copolymer)

Color of the outer cover: yellow

Marking, e.g.:

SIENOPYR(120) (N)HXSGAFHXOE 25 3,6/6 kV

Temperatures

Maximum permissible operation temperature at conductor 20 000 h 120 °C

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

Lowest permissible temperatures for operation, handling, installation, transport and storage
flexing -25 °C
fixed -40 °C

Current-carrying capacity

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

Special characteristics

- Burning behavior
Tested to DIN EN 50265-2-1 (VDE 0482 part 265-2-1) and to DIN EN 50266-2-4 (VDE 0482 part 266-2-4)
- 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.)

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	1.11	1.08	1.05	1.03	1.00	0.97	0.94	0.91	0.88	0.85	0.82	0.78	0.75	0.71	0.67	0.62	0.58	0.53	0.47



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SIENOPYR(120)

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 643	2,5	-	9,1	9,8	59	98	78	113	0,64	1576
6	5DF9 644	3,2	-	9,8	10,5	63	105	84	141	0,96	1762
10	5DF9 645	4,1	-	10,6	11,8	71	118	94	191	1,60	2003
16	5DF9 646	5,6	-	12,5	13,7	82	137	110	282	2,56	2601
25	5DF9 647	6,8	-	14,2	15,4	92	154	123	391	4,00	3277
35	5DF9 648	8,1	-	15,5	17,0	102	170	136	500	5,60	3676
50	5DF9 650	9,6	-	17,0	18,5	111	185	148	650	8,00	4135
70	5DF9 651	11,2	-	18,7	20,2	121	202	162	860	11,20	4625
95	5DF9 652	13,2	-	21,0	22,5	135	225	180	1110	15,20	5740
120	5DF9 653	14,9	-	23,2	24,7	148	247	198	1390	19,20	6670
150	5DF9 654	16,6	-	24,7	26,9	161	269	215	1690	24,00	7257
185	5DF9 655	18,0	-	26,4	28,6	172	286	229	1980	29,60	7741
240	5DF9 656	21,2	-	29,8	32,0	192	320	256	2590	38,40	8847
(N)HXSGAFCHXÖ 3,6/6 kV (with screen)											
4	5DF9 723	2,5	8,5	10,2	11,4	68	228	91	153	0,64	1829
6	5DF9 724	3,2	9,1	10,8	12,0	72	240	96	183	0,96	2021
10	5DF9 725	4,1	10,1	11,8	13,0	78	260	104	233	1,60	2288
16	5DF9 726	5,6	11,8	13,9	15,1	91	302	121	352	2,56	2956
25	5DF9 727	6,8	13,7	15,5	17,0	102	340	136	470	4,00	3677
35	5DF9 728	8,1	15,0	17,1	18,6	112	372	149	585	5,60	4101
50	5DF9 737	9,6	16,5	18,7	20,2	121	404	162	835	8,00	4599
70	5DF9 730	11,2	18,2	20,1	21,6	130	432	173	985	11,20	5111
95	5DF9 731	13,2	20,5	22,4	23,9	143	478	191	1230	15,20	6247
120	5DF9 732	14,9	22,4	24,6	26,8	161	536	214	1520	19,20	7265
150	5DF9 733	16,6	24,1	26,1	28,3	170	566	226	1830	24,00	7886
185	5DF9 734	18,0	25,8	27,8	30,0	180	600	240	2130	29,60	8431
240	5DF9 735	21,2	29,4	31,2	33,4	200	668	267	2740	38,40	9646

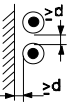


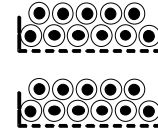

*) Permissible short-circuit currents I_{thz} for other break times t_k up to 5 s are calculated using the formula

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



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 Current-carrying capacity

Continuous operation
 Maximum permissible operation temperature at conductor in °C : **120**
 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																															
2,5	49	43	40	38	37	36	36	35	35	35	30	28	26	23	22	33	29	26	25	22	21	35	28	25	24	20	19					
4	65	57	53	51	49	48	47	47	46	46	40	37	34	31	29	44	38	35	33	29	28	46	38	34	31	27	25					
6	82	71	66	64	62	61	60	59	58	58	51	47	43	39	37	55	48	44	41	37	35	58	48	43	39	34	31					
10	116	101	94	90	87	86	85	84	82	82	72	66	61	55	52	78	68	63	58	52	50	82	67	60	56	48	44					
16	156	136	126	122	117	115	114	112	111	111	97	89	83	73	70	105	92	84	78	70	67	111	90	81	75	64	59					
25	206	179	167	161	155	152	150	148	146	146	128	117	109	97	93	138	122	111	103	93	89	146	119	107	99	84	78					
35	256	223	207	200	192	189	187	184	182	182	159	146	136	120	115	172	151	138	128	115	110	182	148	133	123	105	97					
50	323	281	262	252	242	239	236	233	229	229	200	184	171	152	145	216	191	174	162	145	139	229	187	168	155	132	123					
70	407	354	330	317	305	301	297	293	289	289	252	232	216	191	183	273	240	220	204	183	175	289	236	212	195	167	155					
95	486	423	394	379	365	360	355	350	345	345	301	277	258	228	219	326	287	262	243	219	209	345	282	253	233	199	185					
120	571	497	463	445	428	423	417	411	405	405	354	325	303	268	257	383	337	308	286	257	246	405	331	297	274	234	217					
150	659	573	534	514	494	488	481	474	468	468	409	376	349	310	297	442	389	356	330	297	283	468	382	343	316	270	250					
185	750	653	608	585	563	555	548	540	533	533	465	428	398	353	338	503	443	405	375	338	323	533	435	390	360	308	285					
240	900	783	729	702	675	666	657	648	639	639	558	513	477	423	405	603	531	486	450	405	387	639	522	468	432	369	342					
300	1041	906	843	812	781	770	760	750	739	739	645	593	552	489	468	697	614	562	521	468	448	739	604	541	500	427	396					
400	1250	1088	1013	975	938	925	913	900	888	888	775	713	663	588	563	838	738	675	625	563	538	888	725	650	600	513	475					



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 Current-carrying capacity

Continuous operation
 Maximum permissible operation temperature at conductor in °C : **120**
 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																											
2,5	47	40	37	35	44	38	34	32	31	30	29	29	28	37	30	26	24	22	21	20	19	19	18	17	16	15	14	
4	62	52	49	46	59	50	44	42	41	40	39	38	38	49	40	35	32	30	28	27	26	25	24	22	21	20	19	
6	78	66	62	58	74	63	56	53	51	50	49	48	48	62	50	44	41	37	36	34	32	31	30	28	27	26	24	
10	110	94	87	83	105	89	79	75	73	71	69	68	67	88	71	62	57	53	50	48	46	44	42	40	38	36	34	
16	148	126	117	111	141	120	107	101	98	95	93	92	90	119	95	83	77	71	68	64	62	59	57	53	51	49	45	
25	196	166	155	147	186	159	141	133	129	125	123	121	119	157	125	110	102	94	89	85	81	78	75	70	67	64	59	
35	243	207	192	182	231	197	175	165	161	156	153	151	148	195	156	136	126	117	111	105	101	97	93	88	84	80	74	
50	307	261	242	230	292	249	221	209	203	196	193	190	187	245	196	172	160	147	140	133	128	123	118	110	106	101	93	
70	387	329	305	290	367	313	278	263	255	247	244	240	236	309	247	217	201	186	176	167	161	155	148	139	133	127	118	
95	462	392	365	346	439	374	332	314	305	295	291	286	282	369	295	259	240	222	211	199	192	185	177	166	159	151	140	
120	542	461	429	407	515	439	391	369	358	347	342	336	331	434	347	304	282	260	247	234	226	217	208	195	187	178	165	
150	626	532	495	470	595	507	451	426	413	401	394	388	382	501	401	351	326	301	285	270	260	250	240	225	215	205	190	
185	713	606	563	534	677	577	513	485	470	456	449	442	435	570	456	399	371	342	325	308	296	285	274	257	245	234	217	
240	855	727	675	641	812	693	616	581	564	547	539	530	522	684	547	479	445	410	390	369	356	342	328	308	294	280	260	
300	989	841	781	742	940	801	712	672	653	633	623	613	603	791	633	554	514	475	451	427	411	396	380	356	340	324	301	
400	1188	1009	938	891	1128	962	855	808	784	760	748	736	724	950	760	665	618	570	542	513	494	475	456	428	409	390	361	



Markenname <i>Trade mark</i>	Bauartkurzzeichen <i>Type designation</i>
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SIENOPYR(120)

(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