

with tinned conductor

Halogen-free Special Rubber-insulated Cables

SIENOPYR(90) (N)HXSGAFHXÖ 1,8/3 kV
SIENOPYR(90) (N)HXSGAFCHXÖ 1,8/3 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 tinned copper wires, class 5 according to DIN VDE 0295 and IEC 60228
- Insulation made of a halogen-free, cross-linked EPR compound (Ethylene propylene rubber)
- Shielded versions feature tinned copper, braided wires.
- Cover made of a halogen-free, cross-linked EVA compound which provides mechanical protection during installation (Ethylene-vinylacetat-copolymer)

Color of the outer cover: black

Marking, e.g.:

SIENOPYR(90) (N)HXSGAFHXOE 25 1,8/3 kV

Temperatures

Maximum permissible operation temperature at conductor 20 000 h 90 °C

Maximum permissible short-circuit temperature at conductor max. 5 s 200 °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

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
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

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 1,8/3 kV

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

- single-phase and three-phase AC operation
line-earth / line-line 2,1/3,6 kV
- DC operation
line-earth / line-line 2,7/5,4 kV

AC test voltage (test duration) 6 kV (5 min.)



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SIENOPYR(90)

Selection data

with tinned 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. mm	max. mm	fixed installation mm	free-flexing mm	in bogie mm			

(N)HXSGAFHXÖ 1,8/3 kV (without screen)

1,5	5DF9	1,5	-	5,4	6,2	37	62	50	47	0,18	594
2,5	5DF9	1,9	-	5,9	6,6	40	66	53	60	0,31	660
4	5DF9 063	2,5	-	6,5	7,3	44	73	58	85	0,49	785
6	5DF9 073	3,2	-	7,1	7,9	47	79	63	103	0,73	874
10	5DF9 103	4,1	-	8,5	9,3	56	93	74	157	1,22	1191
16	5DF9 123	5,6	-	9,9	11,1	67	111	89	233	1,95	1467
25	5DF9 133	6,8	-	12,1	13,3	80	133	106	351	3,05	2160
35	5DF9 143	8,1	-	13,2	14,4	86	144	115	454	4,27	2451
50	5DF9 153	9,6	-	14,6	16,1	97	161	129	610	6,10	2847
70	5DF9 163	11,2	-	16,0	17,5	105	175	140	810	8,54	3145
95	5DF9 173	13,2	-	19,0	20,5	123	205	164	1065	11,59	4122
120	5DF9 183	14,9	-	20,6	22,1	133	221	177	1318	14,64	4549
150	5DF9 203	16,6	-	22,7	24,2	145	242	194	1611	18,30	5249
185	5DF9 213	18,0	-	24,5	26,0	156	260	208	1946	22,57	6107
240	5DF9 223	21,2	-	28,0	30,2	181	302	242	2540	29,28	7461

(N)HXSGAFCHXÖ 1,8/3 kV (with screen)

4	5DF9 693	2,5	5,9	7,7	8,4	50	168	67	120	0,49	1013
6	5DF9 694	3,2	6,5	8,4	9,1	55	182	73	112	0,73	1116
10	5DF9 695	4,1	7,9	9,8	10,5	63	210	84	196	1,22	1465
16	5DF9 696	5,6	9,4	11,2	12,4	74	248	99	232	1,95	1778
25	5DF9 683	6,8	11,5	13,3	14,5	87	290	116	425	3,05	2554
35	5DF9 692	8,1	12,7	14,5	15,7	94	314	126	530	4,27	2875
50	5DF9 660	9,6	14,3	16,1	17,6	106	352	141	697	6,10	3253
70	5DF9 680	11,2	15,8	17,5	19,0	114	380	152	908	8,54	3580
95	5DF9 685	13,2	18,5	20,4	21,9	131	438	175	1173	11,59	4610
120	5DF9 686	14,9	20,3	22,0	23,5	141	470	188	1444	14,64	5070
150	5DF9 697	16,6	22,0	24,1	25,6	154	512	205	1803	18,30	6005
185	5DF9 698	18,0	23,8	25,9	28,1	169	562	225	2089	22,57	6814

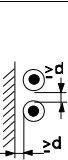



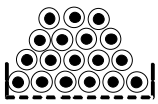
*) Permissible short-circuit currents I_{thz} for other break times t_k up to 5 s are calculated using the formula

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



Halogen-free Special Rubber-insulated Cables
 SIENOPYR(90) (N)HXSGAFHXÖ, (N)HXSGAFCHXÖ
 Current-carrying capacity

Continuous operation
 Maximum permissible operation temperature at conductor in °C : **90**
 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																																
1,5	30	26	24	23	23	22	22	22	21	21	19	17	16	14	14	20	18	16	15	14	13	21	17	16	14	12	11						
2,5	41	36	33	32	31	30	30	30	29	29	25	23	22	19	18	27	24	22	21	18	18	29	24	21	20	17	16						
4	55	48	45	43	41	41	40	40	39	39	34	31	29	26	25	37	32	30	28	25	24	39	32	29	26	23	21						
6	70	61	57	55	53	52	51	50	50	50	43	40	37	33	32	47	41	38	35	32	30	50	41	36	34	29	27						
10	98	85	79	76	74	73	72	71	70	70	61	56	52	46	44	66	58	53	49	44	42	70	57	51	47	40	37						
16	132	115	107	103	99	98	96	95	94	94	82	75	70	62	59	88	78	71	66	59	57	94	77	69	63	54	50						
25	176	153	143	137	132	130	128	127	125	125	109	100	93	83	79	118	104	95	88	79	76	125	102	92	84	72	67						
35	218	190	177	170	164	161	159	157	155	155	135	124	116	102	98	146	129	118	109	98	94	155	126	113	105	89	83						
50	276	240	224	215	207	204	201	199	196	196	171	157	146	130	124	185	163	149	138	124	119	196	160	144	132	113	105						
70	347	302	281	271	260	257	253	250	246	246	215	198	184	163	156	232	205	187	174	156	149	246	201	180	167	142	132						
95	416	362	337	324	312	308	304	300	295	295	258	237	220	196	187	279	245	225	208	187	179	295	241	216	200	171	158						
120	488	425	395	381	366	361	356	351	346	346	303	278	259	229	220	327	288	264	244	220	210	346	283	254	234	200	185						
150	566	492	458	441	425	419	413	408	402	402	351	323	300	266	255	379	334	306	283	255	243	402	328	294	272	232	215						
185	644	560	522	502	483	477	470	464	457	457	399	367	341	303	290	431	380	348	322	290	277	457	374	335	309	264	245						
240	775	674	628	605	581	574	566	558	550	550	481	442	411	364	349	519	457	419	388	349	333	550	450	403	372	318	295						
300	898	781	727	700	674	665	656	647	638	638	557	512	476	422	404	602	530	485	449	404	386	638	521	467	431	368	341						
400	1050	914	851	819	788	777	767	756	746	746	651	599	557	494	473	704	620	567	525	473	452	746	609	546	504	431	399						
500	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						
630	1450	1262	1175	1131	1088	1073	1059	1044	1030	1030	899	827	769	682	653	972	856	783	725	653	624	1030	841	754	696	595	551						



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 Current-carrying capacity

Continuous operation
 Maximum permissible operation temperature at conductor in °C : **90**
 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																											
1,5	29	24	23	21	27	23	21	19	19	18	18	18	17	23	18	16	15	14	13	12	12	11	11	10	10	9	9	
2,5	39	33	31	29	37	32	28	26	26	25	25	24	24	31	25	22	20	19	18	17	16	16	15	14	13	13	12	
4	52	44	41	39	50	42	38	36	34	33	33	32	32	42	33	29	27	25	24	23	22	21	20	19	18	17	16	
6	67	57	53	50	63	54	48	45	44	43	42	41	41	53	43	37	35	32	30	29	28	27	26	24	23	22	20	
10	93	79	74	70	88	75	67	63	61	60	59	58	57	74	60	52	48	45	42	40	39	37	36	34	32	31	28	
16	125	107	99	94	119	102	90	85	83	80	79	78	76	100	80	70	65	60	57	54	52	50	48	45	43	41	38	
25	167	142	132	125	159	135	120	114	110	107	105	104	102	134	107	94	87	80	76	72	70	67	64	60	58	55	51	
35	207	176	164	155	197	168	149	141	137	133	130	128	126	166	133	116	108	99	94	89	86	83	80	75	71	68	63	
50	262	223	207	197	249	212	189	178	173	168	165	163	160	210	168	147	136	126	120	113	109	105	101	94	90	86	80	
70	330	280	260	247	313	267	237	224	218	211	208	204	201	264	211	185	171	158	150	142	137	132	127	119	113	108	100	
95	395	336	312	296	375	320	285	269	261	253	249	245	241	316	253	221	206	190	180	171	164	158	152	142	136	130	120	
120	464	394	366	348	440	376	334	315	306	297	292	287	283	371	297	260	241	223	211	200	193	185	178	167	159	152	141	
150	538	457	425	403	511	436	387	366	355	344	339	333	328	430	344	301	280	258	245	232	224	215	206	194	185	176	163	
185	612	520	483	459	581	496	440	416	404	392	385	379	373	489	392	343	318	294	279	264	255	245	235	220	210	201	186	
240	736	626	582	552	699	596	530	501	486	471	464	456	449	589	471	412	383	353	336	318	306	295	283	265	253	241	224	
300	853	725	674	640	810	691	614	580	563	546	537	529	520	682	546	478	444	409	389	369	355	341	328	307	293	280	259	
400	998	848	788	748	948	808	718	678	658	638	628	618	608	798	638	559	519	479	455	431	415	399	383	359	343	327	303	
500	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	
630	1378	1171	1088	1033	1309	1116	992	937	909	882	868	854	840	1378	1102	964	895	827	785	744	716	689	661	620	592	565	523	



Markenname <i>Trade mark</i>	Bauartkurzzeichen <i>Type designation</i>
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SIENOPYR(90)

(N) HX SGAF C HXÖ

25

1,8/3 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