TECHNICAL DATA

COMPARISON OF HARMONIZED CABLES WITH IEC, DIN VDE AND HD

PVC-insulated cables according to DIN VDE 0281 in comparison with IEC and HD

Designation	accord. To VDE part…	short designation new	short designation old VDE 0250	nominal cross section (mm2)	nominal voltage Uo/U (V)	according to HD	comparative design to IEC
PVC-wiring cables							
Single wires	0281 part 3	H05V-U	NYFA, NYA	0,5 to 1,0	300/500	HD 21.3 S3	227 IEC 01
Fine wires	0281 part 3	H05V-K	NYFAF, NYAF				227 IEC 01
PVC-insulated cables							
Single wires	0281 part 3	H07V-U	NYA	1,5 to 10	450/750	HD 21.3 S3	227 IEC 01
Multi stranded wires	0281 part 3	H07V-R	NYA	1,5 to 400			227 IEC 01
Fine wires	0281 part 3	H07V-K	NYAF	1,5 to 240			227 IEC 02
Light PVC-Twin cables	0281 part 5	H03VH-Y	NLYZ	0,1	300/300	HD 21.3 S3	227 IEC 41
Twin cables	0281 part 5	H03VH-H	NYZ	0,5+0,75	300/300	HD 21.3 S3	227 IEC 42
PVC-sheated cables 03VV-F							
Round	0281 part 5	H03VV-F	NYLHY rund	0,5+0,75	300/300	HD 21.3 S3	227 IEC 43
Flat	0281 part 5	HO3VVH2-F	NYLHY flach	0,5+0,75			227 IEC 43
PVC-sheated cables 05VV-F							
Round	0281 part 5	HO5VV-F	NYMHY rund	0,75 to 2,5	300/500	HD 21.3 S3	227 IEC 53
			NYMHY rund	1 to 2,5			
Flat	0281 part 5	HO5VVH2-F	NYMHY flach	0,75	300/500		227 IEC 53
PVC-Flat-cable 05VV-H6	0281 part 5	HO5VVH6-F	NYFLY	0,75 to 1	300/500	-	-
PVC-Flat-cable 05VV-H6	0281 part 5	HO5VVH6-F	NYFLY	1,5 to 25	450/750		-

CABLE IDENTIFICATION SYMBOLS ACCORDING TO VDE STANDARS

Cable part or feature	Symbol	Description
Conductor	Li	Flexible multicore conductor
Insulation sheath and materials	G	Natural rubber
	Y	PVC
	2Y	Polyethylene
	2X	Cross-linked polyethylene
	11Y	Polyurethane
	9Y	Polypropylene
Jackets and shields	C	Tinned copper braid shield
	(St)	Aluminium/Polyester tape shield
	(Z)	Galvanized steel braid armour
COLOUR CODING	-J	With protective ground Y/G conductor
	-O	Without protective ground conductor
	Z	Numbered cores
	B	Coloured cores

CURRENT RATINGS General for flexible cables

AMBIENT TEMPERATURE UP TO 30°C

Nominal cross section mm2	Group 1 power rating A	Group 1 protective fuse A	Group 2 power rating A	Group 2 protective fuse A	Group 3 power rating A	Group 3 protective fuse A
0,05	1	–	1	–	2	–
0,14	2	–	2	–	3,5	–
0,25	4	–	4,5	–	6	–
0,34	6	–	6	–	9	–
0,5	9	–	9	–	12	–
0,75	12	–	12	10	15	10
1	15	10	15	10	19	16
1,5	18	16	18	16	24	20
2,5	26	25	26	25	32	25
4	34	25	34	25	42	35
6	44	35	44	35	54	50
10	61	50	61	50	73	63
16	82	80	82	63	98'	80
25	108	100	108	80	129	100
35	135	125	135	100	158	125
50	168	160	168	125	198	160
70	207	200	207	160	245	200
95	250	250	250	200	292	250
120	292	250	292	250	344	315
150	335	315	335	315	391	355
185	382	355	382	355	448	400
240	–	–	453	425	528	500
300	–	–	523	500	608	600
400	–	–	–	–	726	630

GROUP 1 - One or more single core cables and insulated wires laid in duct i. e. PVC-sheated single cores H03V. ./H05V../HO7V.. According to VDE 0281.
GROUP 2 - Multi core cables, i. e. light PVC-sheathed cables, flexible cables, metal-clad wiring cables in open or ventilated conduits.
GROUP 3 - Single core cables, laid open in air with a spacing at least equal to cable diameter, such as single core wirings for switch-and distribution cabinets and rail line distributors.

CONVERSION FACTORS For deviating ambient temperature

Ambient Temperature over 30°

Ambient Temperature	Conversion factors, applied to the above current ratings table: RUBBER insulation	PVC insulation
C°	conversion factors up to 60°C	conversion factors up to 60°C
over 30 bis 35	0,91	0,94
over 35 bis 40	0,82	0,87
over 40 bis 45	0,71	0,79
over 45 bis 50	0,58	0,71
over 50 bis 55	0,41	0,61
over 55 bis 60	–	0,50
over 60 bis 65	–	0,35

Ambient Temperature over 50° (heat resistant)

Conversion factors, applied to the above current ratings table

conversion factors up to 90°C				conversion factors up to 110°C			
over	50 bis	55	0,94	over	50 bis	55	1
over	55 bis	60	0,87	over	55 bis	60	1
over	60 bis	65	0,79	over	60 bis	65	1
over	65 bis	70	0,71	over	65 bis	70	1
over	70 bis	75	0,61	over	70 bis	75	1
over	75 bis	80	0,5	over	75 bis	80	1
over	80 bis	85	0,35	over	80 bis	85	0,91
over	85 bis	90	–	over	85 bis	90	0,82
				over	90 bis	95	0,71
				over	95 bis	100	0,58
				over	100 bis	105	0,41
				over	105 bis	110	–

TABLE I - Permissible currents (ambient temperature 40°C)

Maximum permissible temperature	180°C	200°C	250°C	450°C	450°C
Cross-section mm2	Red or tinned copper core NF C 31-111	Silver-plated copper core NF C 31-111	Nickel-plated copper core class 2 ASTM B 355	Nickel-plated copper core class 27 ASTM B 355	Nickel core 200 ASTM B 160
0,5	11,1	12,4	14,4	16,5	7,7
0,75	14,6	16,3	18,8	21,5	10,1
1	17,8	19,8	22,7	26,0	12,1
1,5	23,4	26,0	29,5	33,8	15,8
2,5	33,0	36,7	41,2	47,2	22,1
4	45,4	50,4	56,0	64,1	30,0
6	59,7	66,3	72,9	83,5	39,1

TABLE II - Correction factors

Ambient °C	180°C	200°C	250°C	450°C
41-50	0,96	0,97	0,98	0,99
51-60	0,91	0,94	0,95	0,99
61-70	0,87	0,90	0,93	0,96
71-80	0,81	0,87	0,90	0,95
81-90	0,77	0,83	0,87	0,93
91-100	0,65	0,72	0,85	0,92
101-120	0,62	0,71	0,79	0,89
121-140	0,50	0,61	0,71	0,86
141-160	0,35	0,50	0,65	0,84
161-180	-	0,35	0,58	0,81
181-200	-	-	0,49	0,78
201-225	-	-	0,35	0,74
226-250	-	-	-	0,69
251-275	-	-	-	0,65
276-300	-	-	-	0,60
301-325	-	-	-	0,55
326-350	-	-	-	0,49
351-375	-	-	-	0,42
376-400	-	-	-	0,34

STRAND MAKE-UP

According to DIN VDE 0295, IEC 60228 and HD 383

Cross Section mm2	Stranded wires Class 2 DIN VDE 0295	Multi-stranded wires	Fine wires Class 5 DIN VDE 0295	Class 6 DIN VDE 0296	Extra fine wires		
	Column 1 no of wires3 x single wire	Column 2 no of wires x single wire	Column 3 no of wires1 x single wire2	Column 4 no of wires1 x single wire2	Column 5 no of wires1 x single wire	Column 6 no of wires1 x single wire	Column 7 no of wires1 x single wire
	mm	mm	mm	mm	mm	mm	mm
0,14			18 x 0,1	18 x 0,1	18 x 0,1	36 x 0,07	72 x 0,05
0,25			14 x 0,15	32 x 0,1	32 x 0,1	65 x 0,07	128 x 0,05
0,34		7 x 0,25	19 x 0,15	42 x 0,1	42 x 0,1	88 x 0,07	174 x 0,05
0,38		7 x 0,27	12 x 0,2	21 x 0,15	48 x 0,1	100 x 0,07	194 x 0,05
0,50	7 x 0,30	7 x 0,3	16 x 0,2	28 x 0,15	64 x 0,1	131 x 0,07	256 x 0,05
0,75	7 x 0,37	7 x 0,37	24 x 0,2	42 x 0,15	96 x 0,1	195 x 0,07	384 x 0,05
1,00	7 x 0,43	7 x 0,43	32 x 0,2	56 x 0,15	128 x 0,1	260 x 0,07	512 x 0,05
1,50	7 x 0,52	7 x 0,52	30 x 0,25	84 x 0,15	192 x 0,1	392 x 0,07	768 x 0,05
2,50	7 x 0,67	19 x 0,41	50 x 0,25	140 x 0,15	320 x 0,1	651 x 0,07	1280 x 0,05
4,00	7 x 0,85	19 x 0,52	56 x 0,3	224 x 0,15	512 x 0,1	1040 x 0,07	
6,00	7 x 1,05	19 x 0,64	84 x 0,3	192 x 0,2	768 x 0,1	1560 x 0,07	
10,00	7 x 1,35	49 x 0,51	80 x 0,4	320 x 0,2	1280 x 0,1	2600 x 0,07	
16,00	7 x 1,70	49 x 0,65	128 x 0,4	512 x 0,2	2048 x 0,1		
25,00	7 x 2,13	84 x 0,62	200 x 0,4	800 x 0,2	3200 x 0,1		
35,00	7 x 2,52	133 x 0,58	280 x 0,4	1120 x 0,2			
50,00	7 x 3,02 / 19 x 1,83	133 x 0,69	400 x 0,4	705 x 0,3			
70,00	19 x 2,17	189 x 0,69	356 x 0,5	990 x 0,3			
95,00	19 x 2,52	259 x 0,69	485 x 0,5	1340 x 0,3			
120,00	37 x 2,03	336 x 0,67	614 x 0,5	1690 x 0,3			
150,00	37 x 2,27	392 x 0,69	765 x 0,5	2123 x 0,3			
185,00	37 x 2,52	494 x 0,69	944 x 0,5	1470 x 0,4			
240,00	61 x 2,24	627 x 0,7	1225 x 0,5	1905 x 0,4			
300,00	61 x 2,50	790 x 0,7	1530 x 0,5	2385 x 0,4			
400,00	61 x 2,89		2035 x 0,5				
500,00	61 x 3,23		1768 x 0,6				

1. The n° of individual wires are without obligation. 2. The diameters of the single wires for each conductor are not allowed to exceed the values stated to DIN VDE 0295 the singles wires of a stranded conductors must have all the same nominal diameters. 3. Minimum number of single wires of stranded conductor. the singles wires of a stranded conductors must have all the same nominal diameters.

AMERICAN STRANDINGS

Size AWG	Section mm2	Stranding (n x mm) 150°		200°		Solid
						mm
		E.U. (n x mm)	U.S.A.(n/awg)	E.U. (n x mm)	U.S.A.(n/awg)	
24	0,21	7 x 0,20	7/32	1 x 0,50	1/24	1 x 0,5
23	0,26	8 x 0,20		1 x 0,60		1 x 0,6
22	0,32	11 x 0,20	7/30	1 x 0,70	1/22	1 x 0,7
21	0,41	13 x 0,20		1 x 0,72		1 x 0,72
20	0,52	16 x 0,20	10/30	5 x 0,40	1/20	1 x 0,81
18	0,82	26 x 0,20	16/30	7 x 0,40	7/26	1 x 1,02
16	1,31	42 x 0,20	26/30	11 x 0,40	7/24	1 x 1,3
15	1,65	33 x 0,25		13 x 0,40		1 x 1,45
14	2,08	42 x 0,25	41/30	17 x 0,40	7/22	1 x 1,62
13	2,63	53 x 0,25		21 x 0,40		1 x 1,82
12	3,31	67 x 0,25	65/30	27 x 0,40	19/0,0185”	1 x 2,04
11	4,17	59 x 0,30		33 x 0,40		1 x 2,3
10	5,26	74 x 0,30	105/30	42 x 0,40	19/0,0234”	1 x 2,6
9	6,63	93 x 0,30		52 x 0,40		1 x 2,9
8	8,36	118 x 0,30	133/29	66 x 0,40	54/25	1 x 3,3
7	10,55	148 x 0,30		84 x 0,40		
6	13,3	106 x 0,40	133/27	106 x 0,40	84/25	
5	16,77	133 x 0,40		133 x 0,40		
4	21,15	168 x 0,40	133/25	168 x 0,40	133/25	
3	26,67	212 x 0,40		212 x 0,40		
2	33,62	267 x 0,40	259/26	267 x 0,40	259/26	
1	42,41	337 x 0,40	259/25	337 x 0,40	259/25	
1/0	53,49	425 x 0,40	259/24	425 x 0,40	259/24	
2/0	67,43	536 x 0,40	259/23	536 x 0,40	259/23	
3/0	85,01	676 x 0,40	259/22	676 x 0,40	259/22	
4/0	107,2	853 x 0,40	259/21	853 x 0,40	259/21	
250 MCM	127	1011 x 0,40	427/22	1011 x 0,40	427/22	
300 MCM	152	1210 x 0,40		1210 x 0,40		
350 MCM	177	1409 x 0,40	427/21	1409 x 0,40	427/21	
400 MCM	203	1616 x 0,40		1616 x 0,40		
450 MCM	228	1815 x 0,40	427/20	1815 x 0,40	427/20	
500 MCM	253	2014 x 0,40	427/0,0341”	2014 x 0,40	427/0,0341”	

AWG/MCM TABLE WIRE GAUGE CONVERSION

based on solid conductors

size awg/mcm	SECTION mm2	normal diameter inches	normal diameter mm	lbs per m	kgs per m
36	0,012	0,0050	0,127	0,0757	0,0343
35	0,016	0,00561	0,143	0,0954	0,0433
34	0,020	0,00630	0,160	0,1203	0,0546
33	0,025	0,00708	0,180	0,1517	0,0688
32	0,032	0,00795	0,202	0,1913	0,0868
31	0,040	0,00893	0,227	0,2413	0,1095
30	0,050	0,01003	0,255	0,3042	0,1380
29	0,065	0,01126	0,286	0,3836	0,1740
28	0,080	0,01264	0,321	0,4837	0,2194
27	0,102	0,01420	0,361	0,6100	0,2767
26	0,128	0,01594	0,405	0,7692	0,3489
25	0,163	0,01790	0,455	0,9699	0,4399
24	0,205	0,02010	0,511	1,223	0,5548

based on solid conductors

size awg/mcm	SECTION mm2	normal diameter inches	normal diameter mm	lbs per m	kgs per m
23	0,259	0,02257	0,573	1,542	0,6995
22	0,325	0,02535	0,644	1,945	0,8823
21	0,412	0,02846	0,723	2,452	1,112
20	0,519	0,03196	0,812	3,154	1,431
18	0,832	0,04030	1,024	5,015	2,275
16	1,310	0,0508	1,290	7,974	3,617
14	2,080	0,0641	1,630	12,68	5,752
12	3,310	0,0808	2,050	20,16	9,145
10	5,270	0,1019	2,590	32,06	14,54
9	6,620	0,1144	2,910	40,42	18,33
8	8,350	0,1285	3,260	51,00	23,13
6	13,30	0,1620	4,110	80,90	36,70
4	21,20	0,2043	5,190	129	58,50

based on solid conductors

size awg/mcm	SECTION mm2	normal diameter inches	normal diameter mm	lbs per m	kgs per m
3	26,70	0,2294	5,830	162	73,50
2	33,6	0,2576	6,54	205	93
1	42,4	0,2893	7,35	259	117
1/0	53,4	0,3249	8,25	326	148
2/0	67,5	0,3648	9,27	411	186
3/0	85,0	0,4096	10,40	518	235
4/0	107,2	0,4600	11,68	653	296
250 MCM	136,0	0,4999	12,70	772	350
300 MCM	161,0	0,5476	13,70	925	420
350 MCM	193,0	0,5917	15,'03	1080	490
400 MCM	225,0	0,6322	16,06	1236	561
450 MCM	257,0	0,7070	17,96	1542	699
500 MCM	322,0	0,7744	19,67	1850	839

TABLE METRIC CONVERSIONS

to convert from	to	multiply by
circular mils	square inches	0,0000007854
circular mils	square mils	0,7854
circular mils	square millimeters	0,0005066
square centimeters	square inches	0,155
square feets	square meters	0,0929
square inches	circular mils	1273240
square inches	square centimeters	6,4516
square inches	square millimeters	645,16
square inches	square mils	1000000
square meters	square feets	10764
square millimeters	square inches	0,00155
square millimeters	circular mils	1973510
square mils	circular mils	1273
square mils	square inches	0,0000001
LENGHT		
centimeters	inches	0,3937
centimeters	feet	0,03281
feet	centimeters	30,48
feet	meters	0,3048
inches	centimeters	2,54
inches	meters	0,0254
inches	millimeters	25,4
inches	mils	1000
kilometers	miles	0,6214
meters	feet	3,2808
meters	inches	39,3701
meters	yards	1,0936

to convert from	to	multiply by
miles	kilometers	1,6093
millimeters	inches	0,03937
millimeters	mils	39,3701
mils	inches	0,001
mils	millimeters	0,0254
yards	meters	0,9144
MISCELLANEUS		
kilograms	pounds	2,205
kilograms per kilometer	pounds per 1000 feet	0,6719
ohms per kilometers	ohms per 1000 feet	0,3048
ohms per 1000 feet	ohms per kilometers	3,2808
ohms per 1000 yard	ohms per kilometers	1,0936
picofarads per foot	picofarads per meter	3,285
pounds	kilograms	0,4536
pounds per 1000 feet	kilograms per kilometer	1,488
pounds per 1000 yards	kilograms per kilometer	0,496
pounds per 1000 yards	pounds per kilometers	1,0936
diam. circle	circumference circle	3,1416
diam. circle	side of equal sphere	0,8862
diam. sphere-cubed	volume of sphere	0,5236
u.s. gallons	imperial gallons (british)	0,8327
u.s. gallons	cubic feet	0,1337
u.s. gallons	pounds of water (20°C)	8,33
cubic feet	pounds of water (4°C)	32,427
feet of water (4°C)	pound per square inch	0,4336
inches of mercury (0°C)	pound per square inch	0,4912
knots	miles per hour	1,1516

GENERAL INFORMATION - DEFINITIONS OF TERMS

FLAME-RETARDANT
To be flame-retardant, the cable must withstand the test specified in IEC standard 60332-3 or IEC 60332-1. Flame retardant cables do not propagate fire and are self-extinguishing. The requirement for passing the test is that after the burner has been removed the cables must extinguish themselves.

IEC 60332-1
Is the flame test for single insulated wire and cable.

IEC 60332-3
Is the flame test for bunched wires and cables. The burner is directed towards the bunch of cables.

FIRE-RESISTANT
To be classified as fire-resistant the cables must withstand the test specified in standard IEC 60331-21. The cables must operate for a minimum of 90 minutes while the burner is directed towards the cable.

SMOKE EMISSION
Smoke emission refers to visibility in a fire. The greater the light transmittance, the better the visibility. When tested in accordance with IEC 61034-1 (test method) and IEC 61034-2 (test requirements) the smoke emission of a cable during fire must not exceed the relative values.

HALOGEN-FREE
Halogen-free refers to the absence of halogens, such as chlorine and fluorine and is determined on the basis of halogen content and the acidity of gases of a cable.

IEC 60754-1
Determines the halogen content of the material. To meet the requirements as halogen-free the halogen content of the material may not exceed 0,5% or 5 mg/g.

IEC 60754-2
Determines the degree of acidity of gases evolved during combustion. The limit values are 4,3 for pH and 10 mikroS for conductivity.

MATERIAL FEATURES

Int. I name	Materials	Temp. rating °C	Density g/cm³	Oxygen index %	Tensile strength N/mm2	Dielectric const. (1 MHz)	Dielectric strength kV/mm	Flexibility	Abrasion resist.
				Thermoplastics					
PVC	Polyvinylchloride	-30 ÷ +70/90	1,25 / 1,60	25 / 30	10 / 25	3,3 / 4,5	30 / 60	good	good
PVC150	Polyvinylchloride	-30 ÷ +70/90	1,25 / 1,60	25 / 30	10 / 25	3,3 / 4,5	30 / 60	good	good
LDPE	Low Density Polyethylene	-60 ÷ +70	0,92 / 0,96	18,00	14,00	2,27	20 / 30	average	average
HDPE	High Density Polyethylene	-60 ÷ +110	0,92 / 0,96	18,00	14,00	2,27	17 / 24	poor	good
XLPE	Crosslinked polyethylene	-80 ÷ +115	0,91 / 0,92	18,00	14 / 40	2,3 / 2,8	20 / 24	average	good
PA	Polyamide Nylon Rilsan	-30 ÷ +105	0,90	18,00	50 / 60	4,00	20 / 30	average	very good
PP	Polypropylene	-30 ÷ +105	0,90	18,00	15 / 34	2,1 / 2,2	26 / 30	average	good
PUR	Polyurethane	-40 ÷ +100	1,20	19,00	30 / 60	3,5 / 6,0	15,00	good	very good
TR	Thermoplastic rubber	-55 ÷ +125	0,98 / 1,24	20 / 25	8 / 10	2,10	22,00	good	good
ETFE	Ethylenetetrafluoroethylene	-100 ÷ +155	1,73 / 1,76	31,00	40 / 50	2,6 / 2,7	20,00	average	very good
FEP	Fluoroethylenepropylene	-100 ÷ +200	2,15	90 / 95	20 / 30	2,1 / 2,2	24,00	average	average
MFA	Methylvinyletherfluoroalkoxy	-100 ÷ +230	2,12 / 2,17	> 95	23,00	2,00	30 / 35	good	good
PFA	Perfluoroalkoxy	-190 ÷ +260	2,17	95,00	20 / 30	2,10	80,00	good	good
PTFE	Polytetrafluoroethylene	-190 ÷ +260	2,17 / 2,2	95,00	14 / 40	2,10	24,00	poor	good
PEEK	Polyethylethylketone	-65 ÷ +200	1,2 / 1,32	35 / 48	34 / 92	3,0 / 3,3	16 / 21	poor	very good
				Elastomers					
CR	Neoprene	-30 ÷ +115	1,25	30 / 35	15,00	12,00	20,00	very good	good
EPM EPR	Ethylene-Polypropilene Copol.	-30 ÷ +115	0,85	30 / 35	5	3,3	35	very good	good
EVA	Vinylethileneacetate, Levaprene	-50 ÷ +125	0,98 / 1,24	20 / 25	6,00	5,00	15,00	very good	average
SIR	Silicone rubber	-55 ÷ +180/250	1,1 / 1,3	20,00	7,00	3,2 / 3,3	26,00	very good	average
				Mineral insulators					
GL	Glass fiber	-55 ÷ +200 / 400	2,80	–	2400,00	3,80	–	average	poor

ITALIAN vs EUROPEAN STANDARDS

1. CEI Standars	TITLE OF STANDARDS	2 . VDE Standards	3. IEC Publications	4. European Harmonizations
CEI 20-11	Technical characteristics and test requirements for insulation and sheat compound of electric cables	0207	–	–
CEI 20-14	PVC insulated cables for electrical systems with rated voltage between 1 kV and 3 kV	0271	227	–
CEI 20-20	PVC insulated cables for electrical systems with rated voltage up to including 450/750V	0281	227	HD 21.1
CEI 20-22	Test on electric cables under fire conditions. Part 2: fire propagation. Part 3: test on bounched wires of cables	0482-266	332-3	EN 50266
CEI 20-29	Conductors for insulated cables	0295	228	HD 383
CEI 20-34	Common test methods for insulating and sheathing materials for electric cables	0472	811	EN 60811
CEI 20-35	Test on gases evolved during combustion of materials from cables	0482-266	332-1	EN 50265
CEI 20-36	Test for electric cables under fire conditions	0472-814	331	
	Specifications for harness cables and telecomunications cables	0812		
CEI 46-4	Low frequency cables and wires with PVC insulation and PVC sheath. General tests and measuring methods		189-1	
CEI 46-6	Low frequency cables and wires with PVC insulation and PVC sheath. Equipment wires with solids or stranded conductors, single, pairs, terms		189-3	

1 - CEI: Italian electrotechnical commitee; 2 - VDE: Verband Deutscher Elektrotchniker;
3 - IEC International Electrotechnical Commission; 4 - CENELEC: European Commitee for Electrotechnical Standardizations.

DESIGNATION SYSTEM ACCORDING TO HAR

Cable part or feature	Symbol	Description
Potentiality	Number	Number of the main cores in cable
	X	Separation code for cables without yellow/green protection
	G	Separation code for cables with yellow/green protection conductor
	Section	Nominal section in mm2 of conductors
Conductor	F	flexible round stranded copper conductor
Insulation	R	PVC compound
Cable shape	O	Cores assembled in round shape
Shield	H	Aluminium tape
	H1	Copper tape
	H2	Copper braid
Protective covering	R	Sheath with PVC compound
Metallic protection	A	Steel with braid armour
	F	Round wire steel armour
	N	Steel tape armour
Sheath	R	PVC compound
Working voltage	300/500V	Nominal voltage
		Uo= 300V phase to earth
		U= 500V phase to phase
	450/750V	Nominal voltage
		Uo= 450V phase to earth
		U= 750V phase to phase
	0,6/1 kV	Nominal voltage
		Uo= 600V phase to earth
		U= 1000V phase to phase

COLOUR CHART

CEI UNEL 00722 / HD 308

*' only for special applications		WITH GROUNDING CONDUCTOR		WITHOUT GROUNDING CONDUCTOR
conductors	2	Blue, Brown	2	Blue, Brown
conductors	3	Y-G, Blue, Brown	3	Brown, Black, Grey
conductors	4	Y-G, Brown, Black, Grey	3*'	Blue, Brown, Black
conductors	4*'	Y-G, Blue, Brown, Black	4	Blue, Brown, Black, Grey
conductors	5	Y-G Blue Brown Black Grey	5	Blue, Brown, Black, Grey, Black
conductors and more	6	black numbered conductors + Y/G	6	black numbered conductors

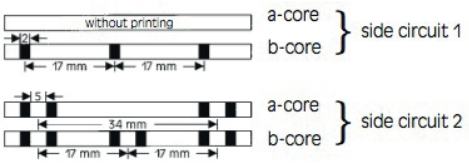
COLOUR CODING TELEPHONE ALARM and CONTROL CABLE

Couple	Alarm Domestic (pairs)	CEI 46-5 Telephone cable (pairs)	Alarm cable NEN 1597 (pairs)	DIN47100 (pairs)		DIN47100 Multicore (conductors)
1	WHITE-RED	WHITE-BLUE	WHITE-RED	WHITE	BROWN	WHITE
2	YELLOW-GREEN	WHITE-ORANGE	WHITE-BLUE	GREEN	YELLOW	BROWN
3	GREY-ORANGE	WHITE-GREEN	WHITE-YELLOW	GREY	PINK	GREEN
4	L.BLUE-BROWN	WHITE-BROWN	WHITE-GREEN	BLUE	RED	YELLOW
5	VIOLET-BLACK	WHITE-GREY	WHITE-BLACK	BLACK	VIOLET	GREY
6	BLUE-PINK	RED-BLUE	WHITE / RED-RED	GREY / PINK	RED / BLUE	PINK
7	W/BROW-W/VIOLET	RED-ORANGE	WHITE / RED-BLUE	WHITE / GREEN	BROWN / GREEN	BLUE
8	W/GREEN-W/BLUE	RED-GREEN	WHITE / RED-YELLOW	WHITE / YELLOW	YELLOW / BROWN	RED
9	W/GREY-W/YELLOW	RED-BROWN	WHITE / RED-GREEN	WHITE / GREY	GREY / BROWN	BLACK
10	W/BLA-W/RED	RED-GREY	WHITE / RED-BLACK	WHITE / PINK	PINK / BROWN	VIOLET
11		BLACK-BLUE		WHITE / BLUE	BROWN / BLUE	GREY / PINK
12		BLACK-ORANGE		WHITE / RED	BROWN / RED	RED / BLUE
13		BLACK-GREEN		WHITE / BLACK	BROWN / BLACK	WHITE / GREEN
14		BLACK-BROWN		GREY / GREEN	YELLOW / GREY	BROWN / GREEN
15		BLACK-GREY		PINK / GREEN	YELLOW / PINK	WHITE / YELLOW
16		YELLOW-BLUE		GREEN / BLUE	YELLOW / BLUE	YELLOW / BROWN
17		YELLOW-ORANGE		GREEN / RED	YELLOW / RED	WHITE / GREY
18		YELLOW-GREEN		GREEN / BLACK	YELLOW / BLACK	GREY / BROWN
19		YELLOW-BROWN		GREY / BLUE	PINK / BLUE	WHITE / PINK
20		YELLOW-GREY		GREY / RED	PINK / RED	PINK / BROWN

Colour code according to DIN VDE 0815

Installation Cables

J-YY . . . Bd, J-HH . . . Bd, J-Y(St)Y . . . Bd, J-H(St)H . . . Bd and J-2Y(St)Y . . . Bd
The Insulating coverings of single cores of a star quad are marked with black rings:



The cores of 5 star quads of a sub unit are counted according to the sequence of basic colours:

Quad 1: basic colour of all cores red
Quad 2: basic colour of all cores green
Quad 3: basic colour of all cores grey
Quad 4: basic colour of all cores yellow
Quad 5: basic colour of all cores white

The marker of units are identified with a red helix, the others with white or uncoloured.
The quads of sub units are counted according to the sequence of basic colours.
The units are counted continuously through all layers beginning in the inner layer.

Installation Cables

J-Y(St)Y . . . Lg
2-paired installation cables are stranded to a star quad.
circuit 1 a-core red, b-core black
circuit 2 a-core white, b-core yellow

4- and multi-paired installation cables
a-core of 1. pair in each layer is red other pairs are white
b-core blue, yellow, green, brown, black in continuous repeat

Counting: from outside to inside

Installation Cables

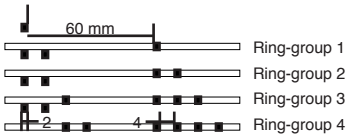
JE-Y(St)Y . . . Bd, JE-LiYCY . . . Bd, JE-H(St) . . . and JE-HCH...Bd
Pair-colour-identification
The insulating cores are identified with different basic colours which are repeated sequencely in each unit.

Basic colours of pairs

Pair	1	2	3	4
a-core	blue	grey	green	white
b-core	red	yellow	brown	black

2-paired cables: the cores are stranded to a star quad:
circuit 1: a-core blue
b-core red
circuit 2: a-core grey
b-core yellow
Each unit is assigned to one group of ring. All cores in each unit are marked with coloured rings and ring-groups.
Counting direction in all units is from inside to outside.

Ring-colour and Ring-group



Unit-identification

Unit No.	Ring colour	Ring group	Colour identification tape
1-2-3-4	pink	I II III IIII	-
5-6-7-8	orange	I II III IIII	-
9-10-11-12	violet	I II III IIII	-
13-14-15-16	pink	I II III IIII	blue
17-18-19-20	orange	I II III IIII	red

cable with more than 12 units contain coloured plastic helix in addition to ring code

CONDUCTOR RESISTANCE

According to DIN VDE 0295, IEC 60228 and HD 383

Nominal Cross Section	Copper conductors plain wires (0hm/km)		Copper conductors tinned wires (0hm/km)		Welding Cable (0hm/km)	
	Class 1 + 2	Class 5 + 6	Class 1 + 2	Class 5 + 6	Copper conductor plain wires	Copper conductor tinned wires
0,05		~380		~392		
0,08		~237		~244		
0,11		~170		~175		
0,13		~150		~155		
0,14		~134		~138		
0,22		~96		~99		
0,25		~76		~79		
0,34		~53		~56		
0,50	36,0	39	36,7	40,1		
0,75	24,5	26	24,8	26,7		
1,00	18,1	19,5	18,2	20		
1,50	12,1	13,3	12,2	13,7		
2,50	7,41	7,98	7,56	8,21		
4,00	4,61	4,95	4,7	5,09		
6,00	3,08	3,3	3,11	3,39		
10,00	1,83	1,91	1,84	1,95		
16,00	1,15	1,21	1,16	1,24	1,16	1,19
25,00	0,727*	0,78	0,734	0,795	0,758	0,78
35,00	0,524*	0,554	0,529	0,565	0,536	0,552
50,00	0,387*	0,386	0,391	0,393	0,379	0,39
70,00	0,268*	0,272	0,27	0,277	0,268	0,276
95,00	0,193*	0,206	0,195	0,21	0,198	0,204
120,00	0,153*	0,161	0,154	0,164	0,155	0,159
150,00	0,124*	0,129	0,126	0,132	0,125	0,129
185,00	0,099	0,106	0,1	108	0,102	0,105
240,00	0,075	0,080	0,076	0,082		
300,00	0,060	0,064	0,061	0,065		
400,00	0,047	0,049	0,048	0,049		

class 1 = single core conductor for single and multi core cables. class 2 = multi core conductor for single and multi core cables. class 5 = fine wire copper conductors for single and multi core cables. class 6 = Extra fine wire copper conductors for single and multi core cables. * = for mineral-insulated cables (class 1 up to 1500 mm2).