

For more than 35 years ISODRA is familiar with the production of ultra-fine copper magnet wire.

**PRODUCTION PROGRAM:** Ultra-fine enamelled copper wire in qualities: Polyurethane, Selfbond, Polyamide, Esterimide, Amide-Imide etc.  
0.015mm – 0.050mm with own wire-drawing and enameling.

**KNOW-HOW:** more than 35 years of experience

**TARGET GROUPS:** Electronics and Electro Technology, Relays, Transponder, Flybacktransformer, Medical Technology, Entertainment Industry, Watches, Measuring Instruments, Identification systems, Loudspeaker, and many more.

**AGA:** Especially we would like to recommend our **AGA products (extremely low-outgas wires)**, which we have developed successfully for our customers, due to a strong interest from their side.

**EXECUTION:** according to DIN EN60-317/IEC 317, Nema, VSM 23761, JIS, KES, BS, etc.

**PRODUCTION:** according to customer's specification.

**WIRE DRAWING:** Due to our own wire drawing we are able to guarantee highest precision and flexibility with very short delivery times.

**ENAMELING:** Special modified machinery for applying very thin layers of varnish.

**ENVIRONMENT:** Due to our biological used-air installation all emissions are being neutralized; also in this matter we are a reliable partner for the future.

The company ISODRA is ISO 9001:2008 certified and all our products meet the ROHS and REACH regulations, as well as they are UL listed.

**RESEARCH / DEVELOPMENT:**

ISODRA Development: **AGA coating (ausgasungsarm)**  
Our AGA coatings achieve extreme low outgassing values.

Today ISODRA is developing a new coating for the *copper wire of the future*. We would be pleased to give you detailed information on this subject in a personal meeting.

**PRECISION:**

ISODRA produces within a tolerance of +/- 3% regarding the nom. Ohm value, or the value given by our customers. Due to our modified enameling machines we are able to apply very thin layers of varnish. This precision allows you to optimize your technical specifications even more, and to use the space more effective.

**QM:**

Each spool, which is delivered by ISODRA, is being controlled on our testing-device according to your special requirements and a label, with the main technical data is being attached.

Conductor Dia (mm)	0.03	100%
Outside Diameter	41.66 ±.4	V155 Qualität
Conductor Resistance	24.13 Ω/m	1 Pinhole
Elongation	6.7% Dehn.	Netto
Inspector	Sch. 15/1997 58584 Klein	Lot No. (week code)

ISODRA receives continuously customers certifications giving us a 100% quality-score.

ISODRA produces only according to customer's orders and requests. The data are determined through a technical-data-sheet, which will be signed by you and becomes part of each order.

Our production protocol can be used as documentation within your QM-system.

**DELIVERY CAPACITY:**

According to individual negotiations with our customers, we create an optimized storage of ready goods, to guarantee just-in-time deliveries.

**CUSTOMER SUPPORT:**

The Management of ISODRA has a long-term experience and is glad to offer you support for technical inquiries of any kind.

**ENVIRONMENTAL THOUGHTS:**

ISODRA is running a self-developed biological air cleaning installation to neutralize all emissions of used air. ISODRA was and will be strongly focused on a clean environmental technology.

## extremely low outgassing Polyurethane wire: "AGA"-wire

acc. EU-Richtlinie 1999/13/EG



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## "AGA" low outgassing wire

**description:** modified, temperature-stable Polyurethane with integrated lubricant. Specially developed for enclosed relays.

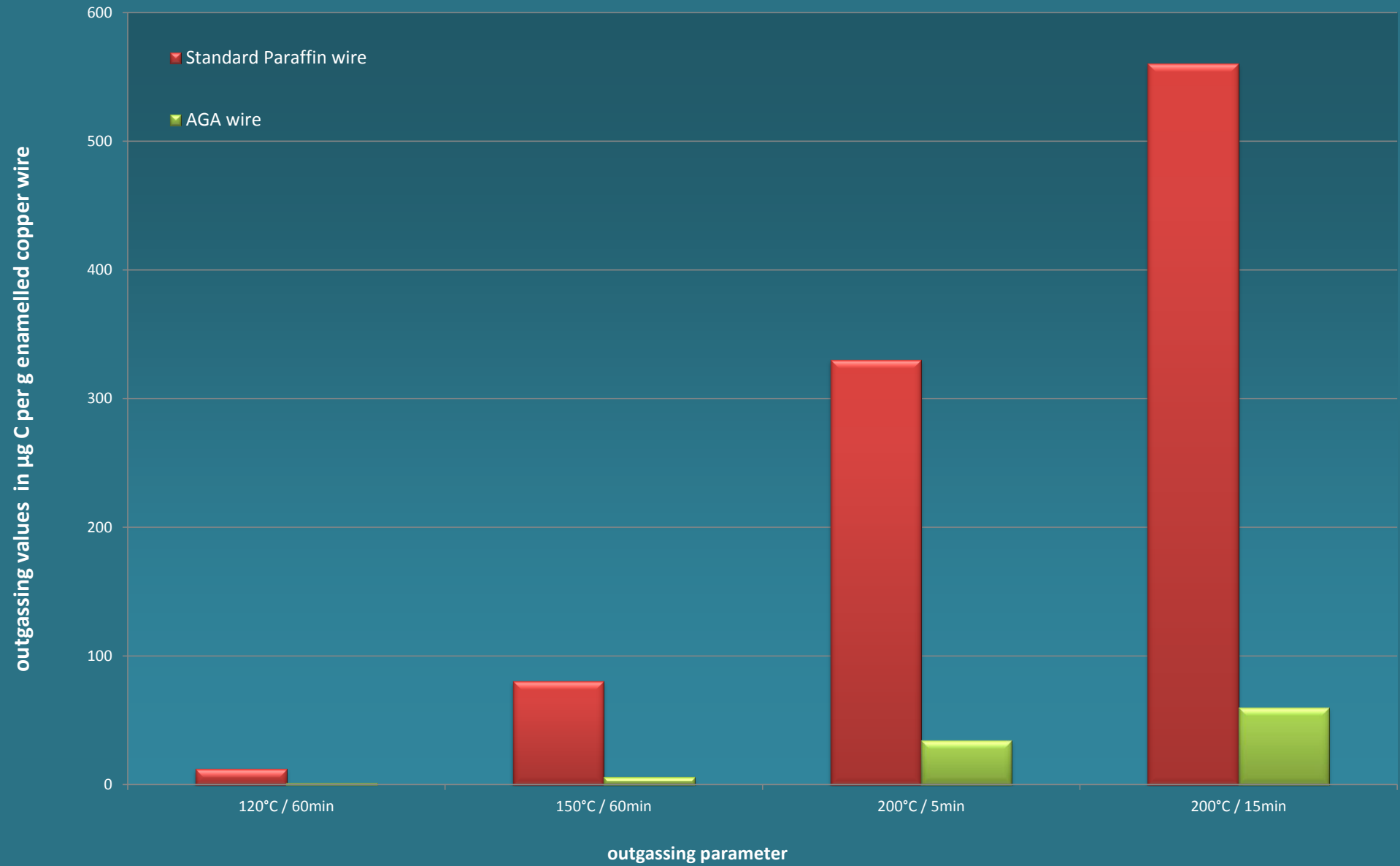
**advantages:** extremely low outgassing, and very high temperature stability.

diameter 0.030mm, outer diameter 0.035mm

Type mod. Polyurethane	V 180
temperature index according DIN EN 172	175°C
cut through temperature acc. to DIN IEC 851.6.4	250°C
heat shock acc. to DIN IEC 851.6.3	200°C
soldering time acc. to DIN IEC 851.4.5 at 375°C	> 1 sec
recommendation for dereeling/unwinding:	teflon felts (no cotton)
slider varnish (no lubricant)	AGA

outgassing (FID)*:	
120°C / 60 min $\mu\text{g} / \text{C/g}$ wire (=ppm)	~ 1
150°C / 60 min $\mu\text{g} / \text{C/g}$ wire (=ppm)	~ 6

\* values depending on nominal diameter and enamel coating



denomination	V 155	V 155 AGA	V 160	V 160 AGA	V 180	V 180 AGA	W 180
characteristics							
thermal class	F 158° C	F 158° C	F 174°C	F 174°C	H 195°C	H 195°C	H 195°C
base coat	modified Polyurethanes	modified Polyurethanes	modified Polyurethanes	modified Polyurethanes	modified Polyurethanes	modified Polyurethanes	Polyesterimide
bonding coat							
reference to the international Standards	IEC 60317-20, IEC 60317-4 MW 79, MW 2, MW 75	IEC 60317-20, IEC 60317-4 MW 79, MW 2, MW 75	IEC 60317-20, -51, IEC 60317-4 MW 79, MW 2, MW 75	IEC 60317-20, -51, IEC 60317-4 MW 79, MW 2, MW 75	IEC 60317-51, IEC 60317-20 MW 82, MW79, MW75	IEC 60317-51, IEC 60317-20 MW 82, MW79, MW75	IEC 60317-23, IEC 60317-8 MW 77, MW 5, MW 26
UL - approval	file E 143017	file E 143017	file E 143017	file E 143017	file E 143017	file E 143017	file E 143017
diameters range (mm)	0,010 - 0,045mm	0,010 - 0,045 mm	0,010 - 0,045 mm	0,010 - 0,045 mm	0,010 - 0,045 mm	0,010 - 0,045 mm	0,010 - 0,045 mm
cut through temperature IEC 60851-6.4 Ø 0,040 mm	≥ 210° C	≥ 210° C	≥ 245° C	≥ 245° C	≥ 260° C	≥ 260° C	≥ 360° C
heat shock IEC 60851-6.3 Ø 0,040 mm	180° C	180° C	180° C	180° C	200° C	200° C	240° C
significant properties	solderability: very good thermal properties: high	solderability: very good thermal properties: high	solderability: very good thermal properties: high	solderability: very good thermal properties: high	solderability: good thermal properties: elevated	solderability: good thermal properties: elevated	solderability: high temperatures thermal properties: high chemical resistance: good
applications	electronics, electro technology, automotive key remote controls, various spools for cars, medical technology: hearing aids, pacemakers, dentist drills motors RELAYS (ISODRA AGA quality = extremely low outgassing), flybackacktransformers, transformer, disc drivers etc. coils for watches, clockworks, movements, coils for measuring instruments, control instruments, transponders, electrical switches etc.						
storage property	storage cool, dry and light protected. Humidity <50%, stable temperature < 23°C						
	≤ 12 months	≤ 12 months	≤ 12 months	≤ 12 months	≤ 12 Monate	≤ 12 months	≤ 6 months
recommended bonding temperature	-----						
resoftening temperature IEC 60851-3 7.1.2.4	-----						
breakdown voltage at 20 °C, 35% humidit. Ø 0.04mm: ISODRA values	160 V/µm	160 V/µm	160 V/µm	160 V/µm	160 V/µm	160 V/µm	160 V/µm
Elongation for Grade 1 wire. Ø 0.04mm: acc. IEC 60851-3.3	≥ 9%	≥ 9%	≥ 9%	≥ 9%	≥ 9%	≥ 9%	≥ 9%
ISODRA values	≥ 18%	≥ 18%	≥ 18%	≥ 18%	≥ 18%	≥ 18%	≥ 18%
solderability for Grade 1. Ø 0.04mm: acc. IEC 60851.4.5	2.0s / 390°C	2.0s / 390°C	2.0s / 390°C	2.0s / 390°C	2.0s / 390°C	2.0s / 390°C	2.0s / 470°C
ISODRA values	<1.0s / 375°C	<1.0s / 375°C	<1.0s / 375°C	<1.0s / 375°C	<1.0s / 390°C	<1.0s / 390°C	<2.0s / 470°C

denomination	SB 155	SB 160	SB 180	VP 160	VP 180	WP 180
characteristics	SB 155	SB 160	SB 180	VP 160	VP 180	WP 180
thermal class	158°C	174°C	195°C	174°C	195°C	195°C
base coat	mod. Polyurethane	mod. Polyurethane	mod. Polyurethane	mod. Polyurethane	mod. Polyurethane	Polyesterimide
bonding coat	Polyvinylbutyral	Polyvinylbutyral	Polyvinylbutyral	Polyamide	Polyamide	Polyamide
reference to the international Standards	IEC 60317-35, IEC 60317-2 MW 131	IEC 60317-35, IEC 60317-2 MW 131	IEC 60317-35, IEC 60317-2 MW 131	IEC 60317-35, IEC 60317-21 MW 131	IEC 60317-35, IEC 60317-21 MW 131	IEC 60317-36, IEC 60317-22
UL - approval	file E 143017	file E 143017	file E 143017	file E 143017	file E 143017	file E 143017
diameters range (mm)	0,010 0,045mm	0,010-0,045mm	0,010-0,045mm	0,010-0,045mm	0,010-0,045mm	0,010-0,045mm
cut through temperature IEC 60851-6.4 Ø 0,040 mm	210°C	245°C	260°C	245°C	260°C	360°C
heat shock IEC 60851-6.3 Ø 0,040 mm	>180°C	>180°C	>200°C	>180°C	>200°C	>200°C
significant properties	hot-air-, oven-, resistance- and solvent bonding			hot-air and solvent bonding		hot-air bonding
applications	coils for medical technology: hearing aids, pacemakers, motor for dentist drills etc. coils for entertainment industry: audioheads, microphones, headphones, mobile phones, coils for watches, clockworks, movements etc. coils for measuring instruments, control instruments, transponders, coils for cards: credit cards, telephone cards, hotel cards, identification cards, etc					
storage property	storage cool, dry and light protected. Humidity <50%, stable temperature < 23°C					
	≤6 months	≤6 months	≤6 months	≤3 months	≤3 months	≤3 months
recommended bonding temperature	140°C	140°C	140°C	170 - 200°C	170 - 210°C	180 - 220°C
resoftening temperature IEC 60851-3 7.1.2.4	≥ 120°C	≥ 120°C	≥ 120°C	≥ 150°C	≥ 150°C	≥ 180°C
breakdown voltage at 20 °C, 35% humidit. Ø 0.04mm: ISODRA values	160 V/μm	160 V/μm	160 V/μm	160 V/μm	160 V/μm	160 V/μm
Elongation for Grade 1 wire. Ø 0.04mm: acc. IEC 60851-3.3	≥ 9%	≥ 9%	≥ 9%	≥ 9%	≥ 9%	≥ 9%
ISODRA values	≥ 18%	≥ 18%	≥ 18%	≥ 18%	≥ 18%	≥ 18%
solderability for Grade 1. Ø 0.04mm: acc. IEC 60851.4.5	1.0s / 375°C	1.0s / 375°C	1.0s / 390°C	2.0s / 390°C	2.0s / 390°C	2.0s / 470°C
ISODRA values	<1.0s / 375°C	<1.0s / 375°C	<1.0s / 390°C	<2.0s / 390°C	<2.0s / 390°C	<2.0s / 470°C

nominal diameter	GRADE 1		GRADE 2		min increase bond coat	GRADE 1B	GRADE 2B	resistance at 20°C		elongation G1		breakdown voltage		length of 1km wire	
	min increase	max overall diameter	min increase	max overall diameter		max overall diameter	max overall diameter	Cu Ω/m min	Cu Ω/m max	min	ISODRA value	Grade 1	Grade 2	Grade1 in km	Grade2 in km
0,018	0,002	0,022	0,004	0,024	0,002	0,024	0,027	60,460	73,890	5 %	> 10 %	100 V	225 V	417,6	398,3
0,019	0,002	0,023	0,004	0,026	0,002	0,025	0,028	54,715	66,870	6 %	> 12 %	120 V	250 V	375,9	356,2
0,020	0,002	0,024	0,004	0,027	0,002	0,026	0,029	48,970	59,850	6 %	> 12 %	120 V	250 V	340,1	323,2
0,021	0,002	0,026	0,005	0,028	0,002	0,029	0,031	44,720	54,660	6 %	> 12 %	130 V	275 V	306,8	292,2
0,022	0,002	0,027	0,005	0,030	0,002	0,030	0,033	40,470	49,470	6 %	> 12 %	130 V	275 V	280,2	265,4
0,023	0,002	0,028	0,005	0,031	0,002	0,031	0,034	37,981	45,043	7 %	> 14 %	150 V	300 V	257,0	244,0
0,024	0,002	0,029	0,005	0,032	0,002	0,032	0,035	35,491	40,616	7 %	> 14 %	150 V	300 V	236,5	225,1
0,025	0,003	0,031	0,005	0,034	0,002	0,034	0,037	31,340	38,310	7 %	> 14 %	150 V	300 V	215,5	205,4
0,027	0,003	0,033	0,005	0,036	0,002	0,037	0,040	28,497	32,130	7 %	> 14 %	170 V	325 V	185,6	177,6
0,028	0,003	0,034	0,005	0,038	0,002	0,038	0,042	24,990	30,540	7 %	> 14 %	170 V	325 V	172,9	164,7
0,030	0,003	0,037	0,006	0,041	0,002	0,042	0,046	21,220	27,560	8 %	> 16 %	190 V	375 V	150,3	142,8
0,032	0,003	0,039	0,006	0,043	0,003	0,044	0,048	19,130	23,380	8 %	> 16 %	190 V	375 V	132,6	126,4
0,034	0,003	0,041	0,006	0,046	0,003	0,047	0,052	18,390	19,610	8 %	> 16 %	225 V	425 V	117,8	112,1
0,036	0,003	0,044	0,007	0,049	0,003	0,050	0,055	15,160	18,420	8 %	> 16 %	225 V	425 V	104,4	99,6
0,038	0,003	0,046	0,007	0,051	0,003	0,052	0,057	14,760	15,660	9 %	> 17 %	250 V	475 V	94,0	89,9
0,040	0,003	0,049	0,008	0,054	0,003	0,055	0,060	12,280	14,920	9 %	> 17 %	250 V	475 V	84,7	80,8
0,043	0,003	0,052	0,008	0,058	0,003	0,059	0,065	11,365	12,440	9 %	> 17 %	275 V	550 V	73,6	70,2
0,045	0,003	0,055	0,009	0,061	0,003	0,062	0,068	9,705	11,790	9 %	> 17 %	275 V	550 V	66,8	63,9
0,048	0,004	0,059	0,010	0,065	0,003	0,067	0,073	9,253	9,814	10 %	> 17 %	300 V	600 V	58,7	56,1
0,050	0,004	0,060	0,009	0,066	0,003	0,068	0,074	7,922	9,489	10 %	> 17 %	300 V	600 V	54,4	52,3
0,053	0,004	0,064	0,010	0,070	0,003	0,072	0,078	7,400	8,090	10 %	> 17 %	325 V	650 V	48,4	46,5
0,056	0,004	0,067	0,010	0,074	0,003	0,075	0,082	6,316	7,565	10 %	> 17 %	325 V	650 V	43,4	41,7
0,060	0,004	0,072	0,011	0,079	0,003	0,081	0,088	5,732	6,464	12 %	> 17 %	375 V	700 V	37,8	36,3
0,063	0,004	0,076	0,012	0,083	0,003	0,085	0,092	5,045	5,922	12 %	> 17 %	375 V	700 V	34,3	32,9

Because ISODRA is producing only to our customers' specifications, ISODRA will always ask you to name us your technical requirements. ISODRA is producing all intermediate sizes, like 0,0205mm for example, as well.



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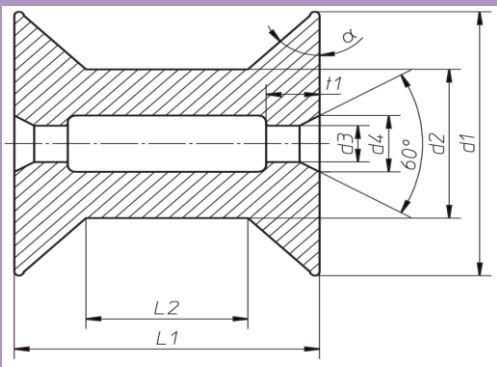
Cu-ETP1

Grade	Cu-ETP1
Standard	ASTM-B49 / DIN EN 1977:2013 Copper and copper alloys. Drawn, round copper wire for the manufacture of electrical conductors
	EN 1977 : 2013 copper and copper alloys. Cast unwrought copper products
Classification	Unalloyed copper grade made from Cu-CATH-1 (CR001A)
Oxygen content [ppm]	< 400

chemical composition [ppm]												
Pb	Bi	As	Sb	Sn	Zn	Fe	Ni	Ag	P	S	Te	Se
0.8	< 0.4	< 0.5	< 1	< 0.8	< 1	< 1.5	< 1.5	< 10.5	< 0.4	4	< 1	< 0.5

## Reels Characteristics

reel type	reels dimensions in mm					reel weight	recommended for sizes from/to (mm)	nom. wire weight	in box
biconical reels	D1	D2	D3	L1	L2	in gr	mm	kg/reel	pcs.
HK 81/45	80	55	16	100	69,5	80	0.018 - 0.027	0,8	18
HK 98/45	100	56	16	100	49	130	0.028 - 0.032	1,6	18
HK 124/45	125	71	16	125	65	160	0.028 - 0.038	3	6
HKL 124/45	125	71	22	200	140	290	0.028 - 0.038	4,5	4
HK 158/45	160	90	22	160	85	315	0.039 - ---	6,5	4



d1 - Flange Diameter / Flanschdurchmesser  
d2 - Barrel Diameter / Kerndurchmesser  
d3 - Bore Diameter / Bohrung  
L1 - Total Width of L2 max. / Gesamtbreite  
L2 - Winding Width (min/max) / Spulbreite

Standard Enameled wire	DIN	NEMA	JIS	KS	BS
UEW (Polyurethane)	IEC 317	NW 2-C	C3211	C3109	4520
AIW (Amide-imide)		---	JCS334	---	---
EIW (Ester-imide)		MW 30-C	JCS333	C3217	4665
SBUEW (Self-bonding)		MW 3-C	C3212	C3126	---

recommended spool sizes			
nom. $\varnothing$	size	alternative: size HK(L) 124	
up to 0,027	HK 81	nom. $\varnothing$	size
0,028	HK 98	0,028	HK(L) 124
up to 0,032	HK 98	up to 0,038	HK(L) 124
0,039	HK 158	0,038	HK(L) 124
up to 0,050	HK 158		

$\varnothing$	MOQ kg
> 0.020	20 kg
> 0.029	30 kg
> 0.044	50 kg
> 0.050	100 kg

insulation classes	
90°C	Y
105°C	A
120°C	E
130°C	B
155°C	F
180°C	H
200°C	N
220°C	R