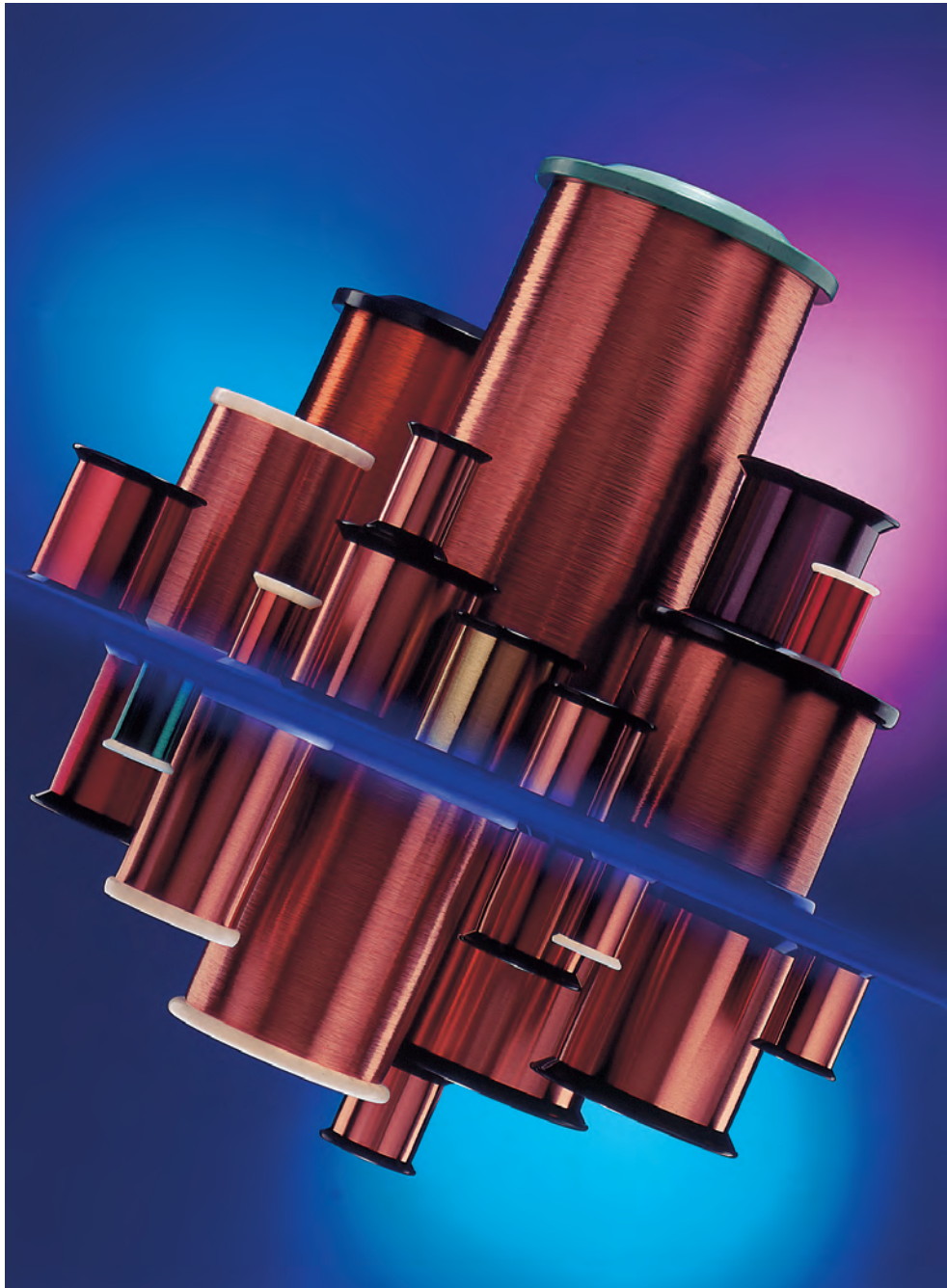


# ELEKTRISOLA

## **Enamelled Copper Wire** Manufacturing Programme and Technical Data



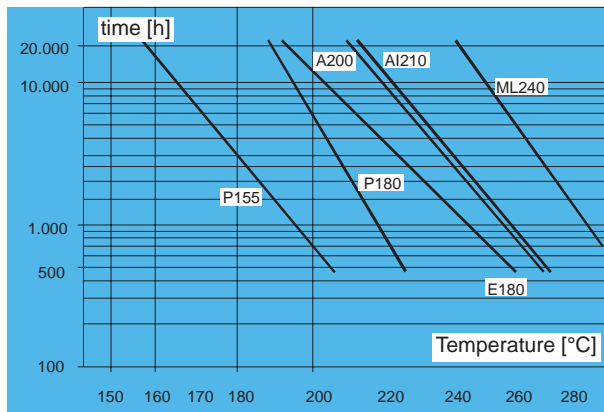
# Technical Data for Enamelled Wires

<b>Conductor materials</b>	copper	oxygen free copper	brass (MS63)	tombak (MS 80)	aluminium	copperplated aluminium
<b>Conductivity (20°C)</b>	58.5 S	58.5 S	15.5 S	18.5 S	35 S	37.5 S

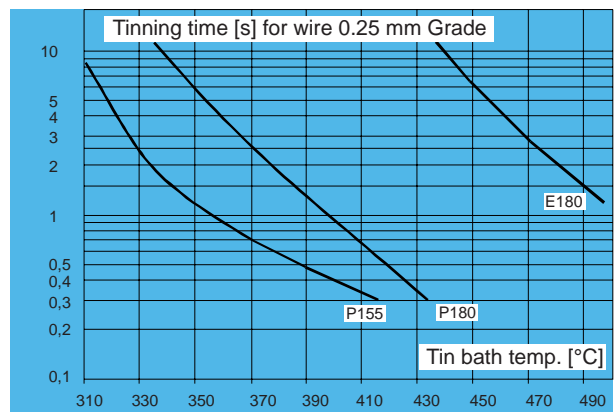
## Correction factor for calculation of resistance of copper at different temperatures

<b>Temperature °C</b>	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
<b>Factor</b>	1.020	1.016	1.012	1.008	1.004	1.000	0.996	0.992	0.988	0.985	0.981	0.977	0.973	0.970	0.966	0.962	0.959	0.955	0.951	0.948	0.944

Diagr. 1: Thermal stability acc. to IEC 60172



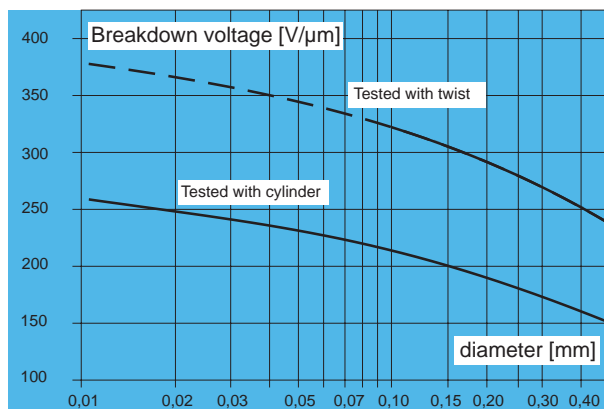
Diagr. 2: Solderability of different wire types



## Calculation of breakdown voltage (Test acc. to IEC 60851.5.4.2, cylinder)

The Breakdown voltage depends mainly on the thickness of the insulation (see formula), but also on the bare wire diameter, the application temperature of the coil and the type of enamel.

For influence of the temperature please check the product table on page 3 and 4.



Diagr. 3: Average breakdown voltage at 20°C depending on diameter

Calculation of average values  $D_s$ :

$$D_s = t \times V_\mu \text{ [Volt], with}$$

$D_s$  : breakdown voltage

$t$  : increase with insulation,  $t = d_a - d_{nom}$ , with

$d_a$  : outer diameter

$d_{nom}$  : bare wire diameter

$V_\mu$  : Volt per micron insulation, see diagr. 3

Example: Test with cylindrical electrode

$$d_{nom} = 0.071 \text{ mm}$$

$$d_a = 0.083 \text{ mm}$$

$$t = d_a - d_{nom} = 0.083 - 0.071 = 0.012 \text{ mm} = 12 \mu\text{m}$$

$$V_\mu = 220 \text{ V}/\mu\text{m}, \text{ therefore}$$

$$D_s = 12\mu \times 220 \text{ V}/\mu = 2,640 \text{ V}$$

# ELEKTRISOLA Enamelled Wire Types

ELEKTRISOLA - Product - Name ELEKTRISOLA - Product - Code	Polysol 155 P155	Polysol 180 P180	Estersol 180 E180	Amidester 200 A200	Amidester 210 AI210	ML240
<b>General</b>						
Description	mod. Polyurethane	mod. Polyurethane	Polyesterimide	Theic-mod. Polyesterimide	A200 + Polyamidimide	Polyimide
Standards <b>IEC</b> (including the following standards) <b>NEMA</b> (including the following standards)	<b>IEC 60317-20</b> , IEC 60317-4 <b>MW 79</b> , MW2, MW75	<b>IEC 60317-51</b> , IEC 60317-20 <b>MW 82</b> , MW 79	<b>IEC 60317-23</b> , IEC 60317-3, 60317-8 <b>MW 77</b> , MW 5, MW 26	IEC 60317-8 <b>MW 74</b> , MW 5, MW 30	<b>IEC 60317-13</b> <b>MW 35</b> , <b>MW 73</b>	<b>IEC 60317-46</b> , IEC 60317-7 <b>MW 16</b>
UL-approval	yes	yes	yes	yes	yes	no, JW 1177
Diameters available	0.010 - 0.50 mm	0.010 - 0.50 mm	0.010 - 0.50 mm	0.010 - 0.50 mm	0.015 - 0.50 mm	0.02 - 0.11 mm, ex USA
<b>Technical values</b>						
<b>1. Thermal values</b>						
Temperature index 20.000 h acc. to IEC 60172	<b>158°C</b>	<b>192°C</b>	<b>195°C</b>	<b>210°C</b>	<b>212°C</b>	<b>245°C</b>
Cut through temperature min °C acc. to IEC 60851.6.4 Elektrisola typical values for 0,05/0,25 mm, Grade 1	≥ 200 °C <b>225°C/230°C</b>	≥ 230°C <b>260/265°C</b>	≥ 265°C <b>315/325°C</b>	≥ 300°C <b>350/360°C</b>	≥ 320°C <b>365/380°C</b>	≥ 400°C <b>450°C</b>
Heat Shock min °C acc. to IEC 60851.6.3 Elektrisola typical values for 0,05/0,25 mm, Grade 1	≥ 175°C <b>190/180°C</b>	≥ 200°C <b>210/200°C</b>	≥ 200°C <b>260/250°C</b>	≥ 200°C <b>230/220°C</b>	≥ 220°C <b>250/240°C</b>	≥ 240°C <b>300°C</b>
<b>2. Electrical values</b>						
Low voltage continuity max. acc. to IEC 60851.5.1 for 0,05 mm/0,25 mm Elektrisola typical values for 0,05/0,25 mm, Grade 1	≤ 60/25 <b>0/0</b>	≤ 60/25 <b>0/0</b>	≤ 60/25 <b>0/0</b>	≤ 60/25 <b>0/0</b>	≤ 60/25 <b>0/0</b>	≤ 60/25 <b>0/0</b>
High voltage continuity max. acc. to IEC 60851.5.2 for 0,05/0,25 mm Elektrisola typical values for 0,05/0,25 mm, Grade 1	≤ 60/25 <b>2/1</b>	≤ 60/25 <b>2/1</b>	≤ 60/25 <b>2/1</b>	≤ 60/25 <b>2/1</b>	≤ 60/25 <b>2/1</b>	≤ 60/25 <b>2/1</b>
Breakdown voltage (at 20°C, 35 % humidity) Elektrisola typical values to cylinder test 0,05/0,25 mm, Grade 1	<b>240/180 V/μm</b>	<b>240/180 V/μm</b>	<b>240/180 V/μm</b>	<b>240/180 V/μm</b>	<b>230/170 V/μm</b>	<b>240/n.a. V/μm</b>
Decrease of breakdown voltage in % at elevated temperature Elektrisola typical values for 0,05 mm, Grade 1, in % at °C for 0,25 mm, Grade 1, in % at °C	<b>25 % at 155°C</b>	<b>20 % at 180°C</b>	<b>20 % at 180°C</b>	<b>20 % at 200°C</b>	<b>20 % at 205°C</b>	<b>15 % at 220°C</b>
<b>3. Mechanical values</b>						
Elongation min. acc. to IEC 60851.3.3 for 0,05/0,25 mm, Grade 1 Elektrisola typical values for 0,05/0,25 mm, Grade 1	≥ 10% / 22% <b>23% / 40%</b>	≥ 10% / 22% <b>23% / 40%</b>	≥ 10% / 22% <b>23% / 40%</b>	≥ 10% / 22% <b>23% / 40%</b>	≥ 10% / 22% <b>23% / 40%</b>	≥ 10% / 22% <b>23% / 40%</b>
Tensile strength min. Elektrisola typical values for 0,05/0,25 mm, Grade 1	<b>57/1370 cN</b>	<b>57/1370 cN</b>	<b>57/1370 cN</b>	<b>57/1370 cN</b>	<b>57/1370 cN</b>	<b>57/1370 cN</b>
<b>4. Chemical compatibility</b>						
Standard solution						
Pencil Hardness acc. to IEC 60851.4.3 / untreated Decrease of breakdown voltage in %	<b>4H/4H</b> <b>5 %</b>	<b>4H/4H</b> <b>0 %</b>	<b>4H/4H</b> <b>0 %</b>	<b>4H/4H</b> <b>5 %</b>	<b>4H/4H</b> <b>0 %</b>	<b>6H/6H</b> <b>0 %</b>
General statements about chemical compatibility are not possible due to the high number of influencing factors such as winding, impregnation-moulding and cleaning materials etc.						
<b>5. Solderability</b> (s. diagram on page 2)						
acc. to IEC 851.4.5. max. seconds at °C for 0,05/0,25 mm Elektrisola typical values acc. to IEC 60851.4.5.1.3 for 0,05 mm, Grade 1, seconds at °C for 0,25 mm, Grade 1, seconds at °C	2s/390°C / 3s/390°C <b>0.3s/370°C / 0.2s/390°C</b> <b>0.7s/370°C / 0.5s/390°C</b>	2s/390°C / 3s/390°C <b>1.8s/370°C / 0.7s/390°C</b> <b>2.8s/370°C / 1.1s/390°C</b>	2s/470°C / 3s/470°C <b>1.8s/470°C</b> <b>2.8s/470°C</b>	-- -- --	-- -- --	-- -- --
<b>Applications</b>						
	Very good solderability and high thermal properties.  Used in small transformers, linear motors, relays, solenoids, small motors, clock coils, fly-back-transformers, magnetic heads, instruments.	Good solderability and elevated thermal values.  Used for automotive coils as relais and ignition coils, in transformers and in solenoids.	Solderable at high temperatures, very good thermal and good chemical resistance.  Used in small motors, small transformers and automotive coils.	High thermal properties and good chemical resistance.  Used in motors, small motors and transformers.	Very high thermal properties and high mechanical resistance.  Used in motors.	Excellent thermal properties, excellent chemical and high radiation resistance.  Used in military and space applications.

Elektrisola typical values are the result of various tests and represent average values.

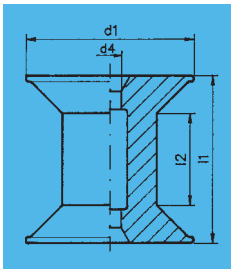
For selfbonding and special types see extra brochures.

# Diameters, tolerances and technical data of enamelled copper wire, based on IEC 60317

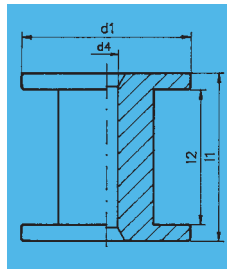
Nominal diameter	Conductor (Bare Wire)		Enamelled Copper Wire (overall diameter)						Resistance at 20°C			minimum elongation to IEC	Minimum breakdown voltage to IEC			1 kg of enamelled wire length approx.			Filling factor			Tension maximum	Nominal diameter
	tolerance	section	Grade 1		Grade 2		Grade 3		nom.	min.	max.		Grade 1	Grade 2	Grade 3	Grade 1	Grade 2	Grade 3	Grad 1	Grad 2	Grad 3		
			mm	mm	mm	mm	mm	mm															
0,010	↑ Resistance tolerance binding	0,00007854	0,012	0,014	0,015	0,016	0,017	0,019	217,65	195,88	239,41	3	110	220		1292,9	1179,4	1069,1	683255	480625	356389	1,4	0,010
0,012		0,000113097	0,014	0,016	0,017	0,018	0,019	0,021	151,14	136,03	166,26	3	110	225		913,6	847,9	782,9	513200	377045	288675	2,0	0,012
<b>0,014</b>		0,000153938	0,016	0,018	0,019	0,020	0,021	0,023	111,04	99,94	122,15	4	110	225		679,4	638,1	596,8	399550	303669	238574	2,5	<b>0,014</b>
<b>0,016</b>		0,000201062	0,018	0,020	0,021	0,022	0,023	0,025	85,02	76,52	93,52	5	110	225		524,9	497,3	469,5	319862	249800	200469	3,2	<b>0,016</b>
<b>0,018</b>		0,000254469	0,020	0,022	0,023	0,024	0,025	0,027	67,18	60,46	73,89	5	110	225		417,6	398,3	378,8	261837	209090	170814	3,9	<b>0,018</b>
0,019		0,000283529	0,021	0,023	0,024	0,026	0,027	0,029	60,29	54,26	66,32	6	120	250		375,9	356,2	336,3	238574	184752	147283	4,3	0,019
<b>0,020</b>		0,000314159	0,022	0,024	0,025	0,027	0,028	0,030	54,41	48,97	59,85	6	120	250		340,1	323,2	306,2	218280	170814	137301	4,7	<b>0,020</b>
0,021		0,000346361	0,023	0,026	0,027	0,028	0,029	0,031	49,35	44,42	54,29	6	130	275		306,8	292,2	279,9	192370	152688	128300	5,1	0,021
<b>0,022</b>		0,000380133	0,024	0,027	0,028	0,030	0,031	0,033	44,97	40,47	49,47	6	130	275		280,2	265,4	252,6	177578	137301	112764	5,5	<b>0,022</b>
0,023		0,000417476	0,025	0,028	0,029	0,031	0,032	0,035	41,14	37,03	45,26	7	150	300		257,0	244,0	231,0	164429	128300	102892	6,0	0,023
0,024		0,000452389	0,026	0,029	0,030	0,032	0,033	0,036	37,79	34,01	41,57	7	150	300		236,5	225,1	213,6	152688	120156	97013	6,5	0,024
<b>0,025</b>		0,000490874	0,028	0,031	0,032	0,034	0,035	0,038	34,82	31,34	38,31	7	150	300		215,5	205,4	195,2	132686	106033	86673	7,0	<b>0,025</b>
0,027		0,000572555	0,030	0,033	0,034	0,036	0,037	0,041	29,86	26,87	32,84	7	170	325		185,6	177,6	168,3	116372	94261	75917	8,0	0,027
<b>0,028</b>		0,000615752	0,031	0,034	0,035	0,038	0,039	0,043	27,76	24,99	30,54	7	170	325		172,9	164,7	155,4	109321	86673	68691	8,5	<b>0,028</b>
0,030		0,000706858	0,033	0,037	0,038	0,041	0,042	0,046	24,18	21,77	26,60	8	190	375		150,3	142,8	135,2	94261	74007	59644	9,6	0,030
<b>0,032</b>		0,000804248	0,035	0,039	0,040	0,043	0,044	0,048	21,25	19,13	23,38	8	190	375		132,6	126,4	120,2	84346	67046	54570	10,8	<b>0,032</b>
0,034		0,00090792	0,037	0,041	0,042	0,046	0,047	0,051	18,83	17,00	20,65	8	225	425		117,8	112,1	106,3	75917	59644	48092	12,0	0,034
<b>0,036</b>		0,00101788	0,040	0,044	0,045	0,049	0,050	0,054	16,79	15,17	18,42	8	225	425		104,4	99,57	94,69	65459	52273	42703	13,2	<b>0,036</b>
0,038	0,001134	0,042	0,046	0,047	0,051	0,052	0,056	15,07	13,61	16,54	9	250	475		93,97	89,87	85,72	59644	48092	39599	14,5	0,038	
<b>0,040</b>	0,001257	0,044	0,049	0,050	0,054	0,055	0,059	13,60	12,28	14,92	9	250	475		84,68	80,81	77,25	53403	42703	35540	15,9	<b>0,040</b>	
0,043	0,001452	0,047	0,052	0,053	0,058	0,059	0,063	11,77	10,63	12,91	9	275	550		73,55	70,15	67,01	47126	37487	31032	18,0	0,043	
<b>0,045</b>	0,001590	0,050	0,055	0,056	0,061	0,062	0,067	10,75	9,71	11,79	9	275	550		66,82	63,85	60,85	41894	33741	27756	19,4	<b>0,045</b>	
0,048	0,001810	0,053	0,059	0,060	0,065	0,066	0,070	9,447	8,596	10,297	10	300	600		58,73	56,08	53,81	36821	29560	24972	21,7	0,048	
<b>0,050</b>	0,001963	0,055	0,060	0,061	0,066	0,067	0,072	8,706	7,922	9,489	10	300	600		54,42	52,26	50,08	34925	28637	23906	23,2	<b>0,050</b>	
0,053	0,002206	0,058	0,064	0,065	0,070	0,071	0,076	7,748	7,051	8,446	10	325	650		48,42	46,45	44,62	31032	25343	21374	25,6	0,053	
<b>0,056</b>	0,002463	0,062	0,067	0,068	0,074	0,075	0,080	6,940	6,316	7,565	10	325	650		43,36	41,69	40,01	27756	22906	19225	28,2	<b>0,056</b>	
0,060	0,002827	0,066	0,072	0,073	0,079	0,080	0,085	6,046	5,562	6,529	12	375	700		37,79	36,33	34,97	24253	19991	16965	31,7	0,060	
<b>0,063</b>	0,003117	0,069	0,076	0,077	0,083	0,084	0,089	5,484	5,045	5,922	12	375	700		34,27	32,92	31,74	21968	18042	15433	34,4	<b>0,063</b>	
0,067	± 0,003	0,003526	0,074	0,080	0,081	0,088	0,093	4,849	4,404	5,360	13	425	700		30,31	29,19	28,21	19475	16172	13944	38	0,067	
0,070	± 0,003	0,003848	0,077	0,083	0,084	0,090	0,096	4,442	4,050	4,890	13	425	700		27,83	26,91	26,06	18042	15256	13208	41	0,070	
<b>0,071</b>	± 0,003	0,003959	0,078	0,084	0,085	0,091	0,097	4,318	3,941	4,748	13	425	700	1100	27,07	26,19	25,37	17599	14911	12930	42	<b>0,071</b>	
0,075	± 0,003	0,004418	0,082	0,089	0,090	0,095	0,102	3,869	3,547	4,235	14	425	850	1200	24,26	23,52	22,82	15796	13495	11781	46	0,075	
<b>0,080</b>	± 0,003	0,005027	0,087	0,094	0,095	0,101	0,108	3,401	3,133	3,703	14	425	850	1200	21,39	20,73	20,11	14098	12023	10473	52	<b>0,080</b>	
0,085	± 0,003	0,005675	0,093	0,100	0,101	0,107	0,114	3,012	2,787	3,265	15	500	900	1300	18,92	18,37	17,86	12400	10676	9372	57	0,085	
<b>0,090</b>	± 0,003	0,006362	0,098	0,105	0,106	0,113	0,120	2,687	2,495	2,900	15	500	900	1300	16,92	16,43	15,96	11208	9630	8435	63	<b>0,090</b>	
0,095	± 0,003	0,007088	0,103	0,111	0,112	0,119	0,126	2,412	2,247	2,594	16	500	950	1400	15,19	14,75	14,35	10086	8656	7632	69	0,095	
<b>0,100</b>	± 0,003	0,007854	0,108	0,117	0,118	0,125	0,132	2,177	2,034	2,333	16	500	950	1400	13,72	13,31	12,97	9124	7822	6939	75	<b>0,100</b>	
0,106	± 0,003	0,008825	0,115	0,123	0,124	0,132	0,140	1,937	1,816	2,069	17	1300	2700	3900	12,22	11,88	11,56	8154	7048	6197	83	0,106	
0,110	± 0,003	0,009503	0,119	0,128	0,129	0,137	0,145	1,799	1,690	1,917	17	1300	2700	3900	11,34	11,03	10,74	7571	6528	5767	88	0,110	
<b>0,112</b>	± 0,003	0,009852	0,121	0,130	0,131	0,139	0,147	1,735	1,632	1,848	17	1300	2700	3900	10,95	10,65	10,37	7331	6336	5607	91	<b>0,112</b>	
0,118	± 0,003	0,010936	0,128	0,136	0,137	0,145	0,154	1,563	1,474	1,660	17	1500	2800	4100	9,870	9,626	9,379	6627	5808	5132	99	0,118	
0,120	± 0,003	0,011310	0,130	0,138	0,139	0,148	0,157	1,511	1,426	1,604	17	1500	2800	4100	9,550	9,305	9,057	6431	5607	4933	102	0,120	
<b>0,125</b>	± 0,003	0,012272	0,135	0,144	0,145	0,154	0,163	1,393	1,317	1,475	17	1500	2800	4100	8,803	8,575	8,356	5934	5166	4567	110	<b>0,125</b>	
0,130	± 0,003	0,013273	0,141	0,150	0,151	0,160	0,169	1,288	1,220	1,361	18	1600	3000	4200	8,131	7,928	7,733	5454	4775	4241	118	0,130	
0,132	± 0,003	0,013685	0,143	0,152	0,153	0,162	0,171	1,249	1,184	1,319	18	1600	3000	4200	7,891	7,697	7,511	5307	4655	4140	121	0,132	
<b>0,140</b>	± 0,003	0,015394	0,151	0,160	0,161	0,171	0,181	1,110	1,055	1,170	18	1600	3000	4200	7,030	6,860	6,687	4775	4190	3707	133	<b>0,140</b>	
0,150	± 0,003																						

# Spools and Packaging

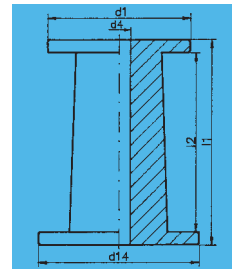
Spool types	Graph	Wire sizes	Characteristics
Biconical	1	0.010 - 0.15 mm	Biconical spool for fine and ultrafine wire, superb de-reeling capability, ideal for high speed winding machines.
Cylindrical	2	0.05 - 0.50 mm	Straight barrel spool, solid traditional design.
Tapered	3	0.10 - 0.50 mm	Stable winding due to tapered barrel spool for heavier sizes.



Graph 1: Biconical spool



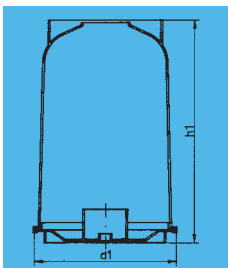
Graph 2: Cylindrical spool



Graph 3: Tapered spool

spool type	graph	d1 [mm]	d4 [mm]	l1 [mm]	l2 [mm]	d14 [mm]	spool weight [g]	nom. net wire weight (grade 1) [kg]	wire sizes recommended [mm]	spools per box	units per pallet
76/45	1	63.5	16	86	60	--	70	0.3	0.010 - 0.019	6	120
79/45	1	80	16	100	70	--	80	0.7	0.020 - 0.024	4	72
80	2	80	16	80	64	--	70	0.7	0.025 - 0.030	12/32	40/18
99/45R	1	100	16	100	49	--	127	1.2	0.024 - 0.029	9	18
99L	1	100	16	125	96	--	150	1.0	0.016 - 0.032	4/6	32/20
100	2	100	16	100	80	--	125	1.2	0.030 - 0.036	9	18
124/45R	1	125	16	125	65	--	160	2.5	0.030 - 0.044	6/9	24/24
124L	1	125	22	200	140	--	290	4,5	0.030 - 0.060	4	24
125	2	125	16	125	100	--	200	2,5	0.050 - 0.060	4/9	24
159/45R	1	160	22	160	85	--	315	6.0	0.044 - 0.071	4	18
160	2	160	22	160	128	--	450	6.0	0.050 - 0.071	4	18
199/45R	1	200	22	200	106	--	600	11.0	0.050 - 0.100	2	21
199L	1	200	22	315	221	--	900	21.0	0.050 - 0.090	container	12
200	2	200	22	200	160	--	750	11.0	0.060 - 0.120	2	21
249/45R	1	250	22	250	132	--	1000	25.0	0.063 - 0.140	container	22
250	3	250	22	200	160	250	1050	20.5	0.100 - 0.500	container	22
250	2	250	22	200	160	--	1050	20.5	0.100 - 0.500	container	22
V60	3	235	34	263	228	252	1320	20.5	0.100 - 0.500	container	36
250/400	3	236	100	400	335	250	2250	45.0	0.125 - 0.500	container	11
315/500	3	300	100	500	425	315	4350	90.0	0.250 - 0.500	container	6
400/630	3	375	100	630	530	400	7300	180.0	0.250 - 0.500	container	3

## Containers for large reels:



spool	Dimensions	
	h1	d1
199L	399	260
250	295	305
249/45R	351	306
250/400	500	315
315/500	630	400
400/630	800	500

# The ELEKTRISOLA Group



## Plants

### Germany

Elektrisola Eckenhagen  
51580 Reichshof-Eckenhagen  
Tel.: 02265/12-0  
Fax: 02265/1222  
e-mail: sales@elektrisola.de

### U.S.A.

Elektrisola Inc.  
Boscawen, N. H. 03303  
Tel.: 603/796/2114  
Fax: 603/796/2119  
e-mail: sales@elektrisola-usa.com

### Italy

Elektrisola Atesina I  
39032 Mühlen  
Tel.: 0474/689111  
Fax: 0474/689113  
e-mail: sales@elektrisola.it

### Mexico

Elektrisola S.A. de C.V.  
Periferico M.Gomez Morin 1800  
Cuauhtémoc, Chih., C.P. 31500  
Tel.: 0625-581-9000  
Fax: 0625-581-9001  
e-mail: sales@elektrisola.com.mx

### Italy

Elektrisola Atesina II  
39030 Lutlach  
Tel.: 0474/673211  
Fax: 0474/671104  
e-mail: sales@elektrisola.it

### Malaysia

Elektrisola (Malaysia) Sdn. Bhd.  
Jalan Damai 1, Janda Baik  
28750 Bentong, Malaysia  
Tel.: 9/2210888  
Fax: 9/2210800  
e-mail: sales@elektrisola.com.my

### Switzerland

Elektrisola Feindraht AG  
6182 Escholzmatt  
Tel.: 041/4877700  
Fax: 041/4877800  
e-mail: sales@elektrisola.ch

### China

Elektrisola Hangzhou  
Xiao Ling Tou  
Pingyao, Yuhang  
Hangzhou 311115  
Tel.: ++86-571-8852-0788  
Fax: ++86-571-8852-0780  
e-mail: sales@elektrisola.cn

## European Sales Organisation

### Austria

Christian Fuchs  
Laudongasse 7/3  
1080 Wien  
Tel.: 0222/4086721  
Fax: 0222/4086720  
e-mail: c.fuchs@mac.com

### Denmark, Sweden

BEVI AB  
Bevivägen 1  
384 30 Blomstermala  
Sweden  
Tel.: +46-499-27100  
Fax: +46-499-27105  
e-mail: sales@bevi.se

### Great Britain

Edson Machinery Co. Ltd.  
Unit 5 Snowhill Business Park  
Cophthorne, West Sussex RH10 3EZ  
Tel.: 01342/719719  
Fax: 01342/719718  
e-mail: sales@edson.co.uk  
www.edson.co.uk

### Israel

Shemer Representations Ltd.  
P.O.B. 296  
Yehud 56 101  
Tel.: 03/5365167  
Fax: 03/5360581  
e-mail: shemer@shemerep.co.il  
www.shemerep.co.il

### Poland

MONTEC  
P.O. Box 40  
02-770 Warszawa 130  
Tel. / Fax: 02264 35690  
Mobile 0607283547  
e-mail: montec.m.moniuk@acn.waw.pl

### Spain

ESTANFLUX S.A.  
Biscaia, 383  
08027 Barcelona  
Tel.: 93/3516151  
Fax: 93/3523845  
e-mail: info@estanflux.com  
www.estanflux.com

### Belgium, Luxembourg

J. Boden Trading Office  
Helshovenstraat 10  
3840 Borgloon  
Tel.: 011-582665  
Fax: 011-482644  
e-mail: jos.boden@jbto.be  
www.jbto.be

### Finland

Multirel Oy  
Kivenlahdenkatu 1 A  
02320 Espoo  
Tel.: 09-8190630  
Fax: 09-81906321  
e-mail: sales@multirel.fi

### Greece

Nicolaos G. Asteriadis  
P.O. Box 50330  
54013 Thessaloniki  
Tel.: 02310/278692 + 3  
Fax: 02310/284691  
e-mail: salesath@asteriadis.gr

### Italy

Elektrisola Atesina III  
Via Friuli 5  
20046 Biassono (MI)  
Tel.: 039/2491501  
Fax: 039/2491533  
e-mail: sales@elektrisola.it  
www.elektrisola.com

### Portugal

Mann S.A.  
Avenida Inf. d. Henrique, 620 R/C Esq.  
2750 Cascais  
Tel.: 21/4830864/65  
Fax: 21/4830866  
e-mail: mann@mann.pt

### Bulgaria

Novatech Bulgaria EOOD  
42, Latinka Str.  
Sofia 1113  
Tel.: 02-8703076  
Fax: 02-8702742  
e-mail: info@novatechbg.com

### France

Elektrisola France  
107-111, Rue du Moulin Sarrazin  
95101 Argenteuil Cedex  
Tel.: 1/34110506  
Fax: 1/34113435  
e-mail: info@elektrisola.fr  
www.elektrisola.com

### Hungary

Elmatit Kereskedelmi Kft  
Mélyfűró utca 2/c  
1151 Budapest  
Tel.: 1-320-3641  
Fax: 1-329-0096  
e-mail: pinter@elmatit.hu

### The Netherlands

Wescap B.V.  
Slagenkampweg 3  
7731 TK Ommen  
Tel.: 0529/462830  
Fax: 0529/463176  
e-mail: sales@wescap.nl

### Romania

Afero exim s.r.l.  
44 Manu Victor Str., ap. 1  
021857 Bucuresti  
Tel.: 021/2522103  
Fax: 021/2522053  
e-mail: virgil@afero.ro

### Czech Rep., Slovakia

Ermeg s.r.o  
Zitavská 629/48  
460 11 Liberec 11  
Tel.: 0485 108 148  
Fax: 0485 103 077  
e-mail: pjelinek@ermeg.cz

### Germany

Elektrisola Eckenhagen  
In der Hüttenwiese  
51580 Reichshof-Eckenhagen  
Tel.: 02265/12-0  
Fax: 02265/1222  
e-mail: sales@elektrisola.de  
www.elektrisola.com

### Iran

Aslani Trading Co.  
Shahrak Jandarmery  
Marzadaran Blvd. Sepehr Ave.  
7th Sepehr St. -No. 1622  
Tehran 1463817161  
Tel.: 21/44201417  
Fax: 21/44244577  
e-mail: info@aslani.com

### Norway

Elis Elektro AS  
Jerikoveien 16  
1067 Oslo  
Tel.: 22905670  
Fax: 22905671  
e-mail: post@eliselektro.no

### Russia

Milverton Elektron (LLC)  
Ul. Galernaja 42, Kv. 32  
190 000 St. Petersburg  
Tel.: 905/2856930  
Fax: 812/3142761  
e-mail: milvertonllc@milvertonllc.com

### Ukraine

Pavel Ambulov  
ul. Kutusova 16-1  
01015 Kiev  
Tel.: 067/4059000  
Fax: 044/2757169  
e-mail: ambulov@mail.ru