dahrén

Technical data for winding wire

Wire Power

Whatever your product, we have the ability to provide you with the right winding wire solution, made from fully recyclable copper or aluminium. We are driven by our vision of meeting our customers' needs in exceeding their expectations – in product quality as well as customer service.

Ever since the early days of electricity we have been at the heart of electronic development. Today Dahrén is a leading supplier of winding wire.

We have been a partner to the electronics industry since the early days of electricity and today you will find our high-quality wire in a wide range of applications, from drilling machines and vacuum cleaners to cars, trains and wind turbines. Driven by future-oriented development, adaptability and sustainability, we have grown into a leading supplier of winding wire.

Through our units in Sweden, Poland and Germany we offer extensive production capacity, business support as well as technical competence to meet and exceed your business requirements. This makes us a reliable partner, with in-depth local knowledge as well as the capability and flexibility to handle complex worldwide orders.

Experienced

After more than a century in business, we acquired impressive experience in the production of winding wire enabling us to efficiently support our customers. From just a few small independent businesses we have grown into one of the largest, most modern manufacturers of winding wire, with a capacity of around 65,000 tonnes per year.

Along with our sister companies in the Liljedahl Group, we handle everything from raw materials to customer applications. We control all aspects of the production and logistics chain, thereby ensuring precision quality and punctual delivery.

Dahrén is part of the Liljedahl Group – an industrial and commercial group with operations in Europe and China. The Group is organized into seven divisions: Bare wire, Winding wire, Steel wire, Machine tools, Trucks, Cars and Real estate. All of the Liljedahl Group companies represent strong brands and occupy market-leading positions. The Group has annual sales of SEK 12 billion and 1,400 employees.

Sustainable

We are proud to be an industry leader when it comes to minimizing our environmental impact.

Solvent emissions are significantly below EU directives, copper and aluminium waste is 100 % recycled and all packing is reused. We minimize the copper or aluminium into water supplies and any excess energy is used to heat our premises. Our environmental management system is certified in accordance with ISO.

We also offer Low carbon copper, a certified copper standard, produced with 50% less CO_2 emission. By using low carbon copper, reduction targets in your own industry can be rapidly and efficiently achieved.

Built-in quality

Quality is not only a question of control – it is something you create and integrate into your everyday work.

The raw material for both rectangular and round winding wire is rolled copper or aluminium wire. Rectangular wire is made through an extrusion process, in which a wire rod is pressed through a die to acquire its final dimensions, or through in-line drawing. The wire is then enamelled or covered with yarn, tape or other insulating material, or a combination of materials.

Round wire gains its dimensions through one or more stages of drawing. The inline manufacturing process means that the final drawing, annealing, enamelling and lubricating are performed by the same machine. The Dahrén manufacturing process shortens lead times and improves our flexibility and availability.

Our patented paraffin-wax method includes an advanced procedure for melting wax directly onto the wire. This method has influenced an entire industry into exchanging benzine for our more environmentally friendly method of lubrication.

The Dahrén process assures that customers are supplied with the right quality. The system includes advanced quality-control systems traceability and real-time monitoring of production.

We are certified in accordance with international quality and environmental management systems such as ISO 9001, ISO 14001, ISO 50001 and IATF 16949, to mention just a few. For more detailed information, please visit www.dahrengroup.com, where you also can download certificates and documents.


50

Definitions

Standards

The standards for enamelled and glass-fibre covered winding wire are published by the International Electrotechnical Commission (IEC), an international standardisation body. This internationally established set of specifications covers packaging, test methods, dimensions and product performance and is applied by Dahrén. For tape-insulated special products (DAMIC, DAKAP, etc), internal standards based on established customer requirements are used.

Definitions of dimensions and grades

Round winding wire is defined according to the nominal cross-section diameter, regardless of the insulation thickness. The actual diameter of the insulated product is then limited by the tolerance range:

$Ø_{min}$ = actual conductor diameter + min increase due to insulation; and
$Ø_{max}$ = max overall diameter

Enamelled products are categorized in accordance with the IEC, depending on the grade of the applied insulation, defined as follows:

$Ø_{Grade1} < Ø_{Grade2} < Ø_{Grade3}$

Therefore, properties which depend on the thickness of the insulation (e.g. electrical breakdown voltage, resistance to abrasion, springiness, etc) vary from one grade to the next.

Terminology for resistance, resistivity and area

The resistance of a wire-shaped conductor is:

$$R = \rho \frac{l}{A}$$

where:
l = length of conductor in metres
A = cross-section of conductor in m^2
ρ = resistivity of conductor material in Ωm

The square metre is not a practical unit of measure for conductor area; therefore, in this brochure, A is always stated in mm^2. Applying this unit in the equation above gives ρ expressed in μΩm or, more clearly, $Ωmm^2/m$, which is the unit used in this document. The resistivity is temperature dependent. A temperature of 20°C applies to all of the resistivity-dependent data in the following pages.

Note! Subject to modification.
For more detailed information see our product datasheets.

General technical information

Correlations

Proportions of aluminium and copper under identical conditions of resistance:

Dimension	$Ø_{Al}$	= 1.27 $Ø_{Cu}$
Area	A_{Al}	= 1.63 A_{Cu}
Weight	m_{Al}	= 0.50 m_{Cu}

Copper

Quality standard	ASTM B 49; EN1977 ETP/ETP1
Resistivity (ρCu)	0.01709 $\Omega mm^2/m$
Specific heat (cpCu)	0.368 J/(g K)
Temperature coefficient of resistance (αCu)	3.93 ‰
Coefficient of longitudinal expansion (aCu)	18.5 $.10^{-6}$/K
Specific gravity	8.96 g/cm^3
Thermal conductivity (λCu)	370 – 400 W/(m K)

Aluminium

Quality standard	EN 573-3 (EAl 99.7)
Resistivity (ρAl)	0.02789 $\Omega mm^2/m$
Specific heat (cpAl)	0.207 J/(g K)
Temperature coefficient of resistance (αAl)	4.30 ‰
Coefficient of longitudinal expansion (aAl)	23.8 $.10^{-6}$/K
Specific gravity	2.70 g/cm^3
Thermal conductivity (λAl)	200 W/(m K)

Temperature dependence of resistance

If resistance R_T is measured at a temperature T ≠ 20 °C, then resistance R_{20} can be calculated as follows:

$$R_{20} = \frac{R_T}{1 + \alpha (T - 20)}$$

where:

T = the actual temperature in °C at the time of measurement

α = the temperature coefficient (see the sections above on copper and aluminium)

The temperature coefficients above only apply within the range $15 \geq T \geq 25$ (°C).

Winding wire is a core element in everyday products and modern infrastructure. We offer a complete range of copper and aluminium wire for all types of applications.

Round enamelled copper wire



	Damid 200	Damid 220	Damid 240
CLASS	200	220	240
STANDARD	IEC 60317-13	IEC 60317-57	IEC 60317-46
INSULATION	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide	Polyamide-imide	Polyimide
UL APPROVAL	E101843	E101843	Not approved
DIMENSION RANGE GRADE 1 GRADE 2 GRADE 3	 0.15 – 5.00 0.15 – 5.00 0.355 – 5.00	 0.25 – 2.00 0.25 – 2.00 —	 0.63 – 1.60 0.63 – 1.60 —
PROPERTIES	High heat resistance. Suitable for winding in high speed machines. Very good resistance to transformer oils. Very good resistance to typical solvent. Excellent resistance to mechanical stress.	Abrasion resistance. Excellent heat resistance. Suitable for winding in high speed.	Very high cut-trough temperature. Excellent heat resistance. Very good mechanical resistance. High resistance to PDIV. Very good resistance to partial discharges.
TEMPERATURE INDEX **HEAT SHOCK** **SOLDER TEMPERATURE** **CUT-THROUGH**	≥ 200 °C ≥ 220 °C — ≥ 320 °C	≥ 220 °C ≥ 240 °C — ≥ 350 °C	≥ 240 °C ≥ 260 °C — ≥ 450 °C
REELS AND PACKAGING	www.dahrengroup.com		
OTHER		On request	On request

Cu ● Round enamelled copper wire

	Damidsol 180	Dasol 180
CLASS	180	180
STANDARD	IEC 60317-23	IEC 60317-51
INSULATION	Modified Polyesterimide	Polyurethane
UL APPROVAL	E101843	E101843
DIMENSION RANGE GRADE 1 GRADE 2 GRADE 3	 0.15 – 0.80 0.15 – 0.80 —	 0.15 – 2.00 0.15 – 2.00 —
PROPERTIES	Suitable in high speed winding machines. Directly solderable. Very short soldertime. Excellent mechanical resistance.	Suitable in high speed winding machines. Directly solderable. Very short soldertime. Excellent mechanical resistance.
TEMPERATURE INDEX **HEAT SHOCK** **SOLDER TEMPERATURE** **CUT-THROUGH**	≥ 180 °C ≥ 200 °C ≥ 470 °C ≥ 265 °C	≥ 180 °C ≥ 200 °C ≥ 375 °C ≥ 230 °C
REELS AND PACKAGING	www.dahrengroup.com	
OTHER		

Round enamelled copper wire



	Damid CR 200	Daprest 200	Damidbond 200
CLASS	200	200	200
STANDARD	IEC 60317-13	IEC 60317-13 + internal Dahrén	IEC 60317-38
INSULATION	THEIC-modified polyesterimide, overcoated with polyamide-imide	THEIC-modified polyesterimide, overcoated with polyamide-imide	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide, with a bonding layer
UL APPROVAL	E101843	Not approved	E101843
DIMENSION RANGE			
GRADE 1	0.67 – 2.00	—	0.20 – 1.50
GRADE 2	0.67 – 2.00	0.63 – 1.90	0.20 – 1.50
GRADE 3	0.67 – 2.00	0.63 – 1.90	—
PROPERTIES	Excellent corona effect resistance. High cut-through temperature. Very good heat resistance. Very good mechanical resistance.	Excellent corona effect resistance. Very good heat resistance. High cut-through temperature.	High heat resistance. Suitable for winding in high speed machines. Very good resistance to transformer oils. Very good resistance to typical solvent. Freon resistant. Excellent resistance to mechanical stress. Bondable at 180°C–220°C. High re-softening temperature.
TEMPERATURE INDEX	≥ 200 °C	≥ 200 °C	≥ 200 °C
HEAT SHOCK	≥ 220 °C	≥ 220 °C	≥ 220 °C
SOLDER TEMPERATURE	—	—	—
CUT-THROUGH	≥ 320 °C	≥ 340 °C	≥ 320 °C
REELS AND PACKAGING	www.dahrengroup.com		
OTHER	0.315 – 0.67 on request		

Technical data copper wire

Damid, Dasol, Damid SL, Damid CR, Daprest, Damidsol according to IEC 60317-0-1

NOMINAL CONDUCTOR DIAMETER	CONDUCTOR TOLERANCE +/–	GRADE 1		GRADE 2		GRADE 3		LENGTH (M/KG)			AREA MM²	RESISTANCE 20°C Ω/M
		MIN INCREASE	MAX OVERALL DIAMETER	MIN INCREASE	MAX OVERALL DIAMETER	MIN INCREASE	MAX OVERALL DIAMETER	GRADE 1	GRADE 2	GRADE 3	NOMINAL	NOMINAL
0.150	0.003	0.012	0.171	0.023	0.182	0.033	0.193	6040	5890	5739	0.01767	0.9673
0.160	0.003	0.012	0.182	0.023	0.194	0.033	0.205	5313	5179	5054	0.02011	0.8502
0.180	0.003	0.013	0.204	0.025	0.217	0.036	0.229	4204	4102	4006	0.02545	0.6718
0.200	0.003	0.014	0.226	0.027	0.239	0.039	0.252	3409	3335	3259	0.03142	0.5441
0.212	0.003	0.015	0.240	0.029	0.254	0.043	0.268	3032	2965	2897	0.03530	0.4843
0.224	0.003	0.015	0.252	0.029	0.266	0.043	0.280	2722	2665	2608	0.03941	0.4338
0.236	0.004	0.017	0.267	0.032	0.283	0.048	0.298	2447	2391	2339	0.04374	0.3908
0.250	0.004	0.017	0.281	0.032	0.297	0.048	0.312	2186	2139	2095	0.04909	0.3482
0.265	0.004	0.018	0.297	0.033	0.314	0.050	0.330	1948	1906	1866	0.05515	0.3099
0.280	0.004	0.018	0.312	0.033	0.329	0.050	0.345	1748	1713	1679	0.06158	0.2776
0.300	0.004	0.019	0.334	0.035	0.352	0.053	0.36	1524	1493	1479	0.07069	0.2418
0.315	0.004	0.019	0.349	0.035	0.367	0.053	0.384	1384	1358	1333	0.07793	0.2193
0.335	0.004	0.020	0.372	0.038	0.391	0.057	0.408	1223	1200	1179	0.08814	0.1939
0.355	0.004	0.020	0.392	0.038	0.411	0.057	0.428	1091	1072	1054	0.09898	0.1727
0.375	0.005	0.021	0.414	0.040	0.434	0.060	0.453	978	961	944	0.1104	0.1548
0.400	0.005	0.021	0.439	0.040	0.459	0.060	0.478	861	847	834	0.1257	0.1360
0.425	0.005	0.022	0.466	0.042	0.488	0.064	0.508	763	750	738	0.1419	0.1205
0.450	0.005	0.022	0.491	0.042	0.513	0.064	0.533	682	671	661	0.1590	0.1075
0.475	0.005	0.024	0.519	0.045	0.541	0.067	0.562	612	603	594	0.1772	0.09646
0.500	0.005	0.024	0.544	0.045	0.566	0.067	0.587	553	545	537	0.1963	0.08706
0.530	0.006	0.025	0.576	0.047	0.600	0.071	0.623	492	485	478	0.2206	0.07748
0.560	0.006	0.025	0.606	0.047	0.630	0.071	0.653	442	436	430	0.2463	0.06940
0.600	0.006	0.027	0.649	0.050	0.674	0.075	0.698	385	380	375	0.2827	0.06046
0.630	0.006	0.027	0.679	0.050	0.704	0.075	0.728	350	345	341	0.3117	0.05484
0.650	0.007	0.028	0.702	0.053	0.729	0.080	0.751	328	324	320	0.3318	0.05151
0.670	0.007	0.028	0.722	0.053	0.749	0.080	0.774	309	305	301	0.3526	0.04848
0.710	0.007	0.028	0.762	0.053	0.789	0.080	0.814	276	272	269	0.3959	0.04318
0.750	0.008	0.030	0.805	0.056	0.834	0.085	0.861	247	244	241	0.4418	0.03869
0.800	0.008	0.030	0.855	0.056	0.884	0.085	0.911	217	215	212	0.5027	0.03401
0.850	0.009	0.032	0.909	0.060	0.939	0.090	0.968	193	190	188	0.5675	0.03012
0.900	0.009	0.032	0.959	0.060	0.989	0.090	1.018	172	170	168	0.6362	0.02687
0.950	0.010	0.034	1.012	0.063	1.044	0.095	1.074	154	153	151	0.7088	0.02412
1.000	0.010	0.034	1.062	0.063	1.094	0.095	1.124	139	138	137	0.7854	0.02176
1.060	0.011	0.034	1.124	0.065	1.157	0.098	1.188	124	123	122	0.8825	0.01937
1.120	0.011	0.034	1.184	0.065	1.217	0.098	1.248	111	110	109	0.9852	0.01735
1.180	0.012	0.035	1.246	0.067	1.279	0.100	1.311	100	99	99	1.094	0.01563
1.250	0.013	0.035	1.316	0.067	1.349	0.100	1.381	89	89	88	1.227	0.01393
1.320	0.013	0.036	1.388	0.069	1.422	0.103	1.455	80	80	79	1.368	0.01249
1.400	0.014	0.036	1.468	0.069	1.502	0.103	1.535	71	71	70	1.539	0.01110
1.500	0.015	0.038	1.570	0.071	1.606	0.107	1.640	62	62	61	1.767	0.009673
1.600	0.016	0.038	1.670	0.071	1.706	0.107	1.740	55	54	54	2.011	0.008502
1.700	0.017	0.039	1.772	0.073	1.809	0.110	1.844	49	48	48	2.270	0.007531
1.800	0.018	0.039	1.872	0.073	1.909	0.110	1.944	43	43	43	2.545	0.006718
1.900	0.019	0.040	1.974	0.075	2.012	0.113	2.048	39	39	38	2.835	0.006029
2.000	0.020	0.040	2.074	0.075	2.112	0.113	2.148	35	35	35	3.142	0.005441
2.120	0.021	0.041	2.196	0.077	2.235	0.116	2.272	31	31	31	3.530	0.004843
2.240	0.022	0.041	2.316	0.077	2.355	0.116	2.392	28	28	28	3.941	0.004338
2.360	0.024	0.042	2.438	0.079	2.478	0.119	2.516	25	25	25	4.374	0.003908
2.500	0.025	0.042	2.578	0.079	2.618	0.119	2.656	23	22	22	4.909	0.003482
2.650	0.027	0.043	2.730	0.081	2.772	0.123	2.811	20	20	20	5.515	0.003099
2.800	0.028	0.043	2.880	0.081	2.922	0.123	2.961	18.0	17.9	17.8	6.158	0.002776
3.000	0.030	0.045	3.083	0.084	3.126	0.127	3.166	15.7	15.6	15.5	7.069	0.002418
3.150	0.032	0.045	3.233	0.084	3.276	0.127	3.316	14.2	14.2	14.1	7.793	0.002193
3.350	0.034	0.046	3.435	0.086	3.479	0.130	3.521	12.6	12.5	12.5	8.814	0.001939
3.550	0.036	0.046	3.635	0.086	3.679	0.130	3.721	11.2	11.2	11.1	9.898	0.001727
3.750	0.038	0.047	3.838	0.089	3.883	0.134	3.926	10.0	10.0	10.0	11.04	0.001548
4.000	0.040	0.047	4.088	0.089	4.133	0.134	4.176	8.8	8.8	8.8	12.57	0.001360
4.250	0.043	0.049	4.341	0.092	4.387	0.138	4.431	7.8	7.8	7.8	14.19	0.001205
4.500	0.045	0.049	4.591	0.092	4.637	0.138	4.681	7.0	7.0	6.9	15.90	0.001075
4.750	0.048	0.050	4.843	0.094	4.891	0.142	4.936	6.3	6.2	6.2	17.72	0.0009646
5.000	0.050	0.050	5.093	0.094	5.141	0.142	5.186	5.7	5.6	5.6	19.63	0.0008706

Note! The technical data included is up to date at the time of printing.
Dahrén reserve the right to make any amendments deemed necessary.

Technical data copper wire

Damidbond according to IEC 60317-0-1

NOMINAL CONDUCTOR DIAMETER	CONDUCTOR TOLERANCE +/–	MIN INCREASE BONDING	GRADE 1B		GRADE 2B		LENGTH (M/KG)		AREA MM² NOMINAL	RESISTANCE, 20°C, Ω/M NOMINAL
			MIN INCREASE	MAX OVERALL DIAMETER	MIN INCREASE	MAX OVERALL DIAMETER	GRADE 1B	GRADE 2B		
0.200	0.003	0.011	0.014	0.243	0.027	0.256	3311	3236	0.031	0.544
0.212	0.003	0.012	0.015	0.258	0.029	0.272	2945	2877	0.035	0.484
0.224	0.003	0.012	0.015	0.270	0.029	0.284	2649	2591	0.039	0.434
0.236	0.004	0.013	0.017	0.286	0.032	0.302	2381	2324	0.044	0.391
0.250	0.004	0.013	0.017	0.300	0.032	0.316	2130	2083	0.049	0.348
0.265	0.004	0.013	0.018	0.316	0.033	0.333	1901	1859	0.055	0.310
0.280	0.004	0.013	0.018	0.331	0.033	0.348	1709	1673	0.062	0.278
0.300	0.004	0.014	0.019	0.354	0.035	0.372	1490	1459	0.071	0.242
0.315	0.004	0.014	0.019	0.369	0.035	0.387	1355	1329	0.078	0.219
0.335	0.004	0.015	0.020	0.393	0.038	0.412	1197	1174	0.088	0.194
0.355	0.004	0.015	0.020	0.413	0.038	0.432	1070	1050	0.099	0.173
0.375	0.005	0.016	0.021	0.436	0.040	0.456	959	942	0.110	0.155
0.400	0.005	0.016	0.021	0.461	0.040	0.481	846	831	0.126	0.136
0.425	0.005	0.016	0.022	0.489	0.042	0.511	750	737	0.142	0.120
0.450	0.005	0.016	0.022	0.514	0.042	0.536	671	660	0.159	0.107
0.475	0.005	0.017	0.024	0.543	0.045	0.565	602	592	0.177	0.096
0.500	0.005	0.017	0.024	0.568	0.045	0.590	544	536	0.196	0.087
0.530	0.006	0.017	0.025	0.600	0.047	0.624	485	478	0.221	0.077
0.560	0.006	0.017	0.025	0.630	0.047	0.654	436	429	0.246	0.069
0.600	0.006	0.018	0.027	0.674	0.050	0.699	380	374	0.283	0.060
0.630	0.006	0.018	0.027	0.704	0.050	0.729	345	340	0.312	0.055
0.650	0.007	0.018	0.028	0.728	0.053	0.755	324	319	0.332	0.052
0.670	0.007	0.019	0.028	0.748	0.053	0.775	305	301	0.353	0.048
0.710	0.007	0.019	0.028	0.788	0.053	0.815	272	269	0.396	0.043
0.750	0.008	0.020	0.030	0.832	0.056	0.861	244	241	0.442	0.039
0.800	0.008	0.020	0.030	0.882	0.056	0.911	215	212	0.503	0.034
0.850	0.009	0.020	0.032	0.937	0.060	0.967	190	188	0.567	0.030
0.900	0.009	0.020	0.032	0.987	0.060	1.017	170	168	0.636	0.027
0.950	0.010	0.021	0.034	1.041	0.063	1.073	153	151	0.709	0.024
1.000	0.010	0.021	0.034	1.091	0.063	1.123	138	137	0.785	0.022
1.060	0.011	0.022	0.034	1.154	0.065	1.187	123	122	0.882	0.019
1.120	0.011	0.022	0.034	1.214	0.065	1.247	110	109	0.985	0.017
1.180	0.012	0.022	0.035	1.276	0.067	1.309	100	99	1.094	0.016
1.250	0.013	0.022	0.035	1.346	0.067	1.379	89	88	1.227	0.014
1.320	0.013	0.023	0.036	1.419	0.069	1.453	80	79	1.368	0.012
1.400	0.014	0.023	0.036	1.499	0.069	1.533	71	70	1.539	0.011
1.500	0.015	0.023	0.038	1.602	0.071	1.638	62	61	1.767	0.010

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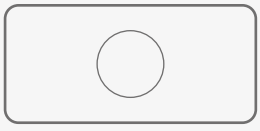
Special products

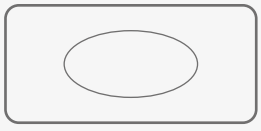
	Damid 200 Tube	**Damid 200 Tube**	**Tube** (Various insulations)
CLASS	200	200	Depend on type of insulation
CONDUCTOR MATERIAL	Cu-DHP (capillary tubes)	Cu-OF, Cu-OFE and CuAg (OF) (hollow conductors)	Cu-OF, Cu-OFE and CuAg (OF) (hollow conductors)
STANDARD	IEC 60317-13	Customer requirement	Customer requirement
INSULATION	Basecoat: THEIC modified polyester or polyesterimide Overcoat: Polyamid-imide	Basecoat: THEIC modified polyester or polyesterimide Overcoat: Polyamid-imide	Enamel, Kapton foil, Mica tape, PET film, glassfibre yarn, glassfibre polyester yarn (combinations possible)
UL APPROVAL	Not approved	E101843	Not approved
DIMENSION RANGE	0.70 ≤ Ø ≤ 1.50 mm With different capillary sizes Dimensions on request	Dimensions on request (shapes see below)	Dimensions on request (shapes see below)
PROPERTIES	Very good abrasion resistance Very good impregnation resistance Very good hydrolysis resistance	High heat resistance, very good resistance to transformer oils, very good resistance to typical solvent, Freon resistant. Excellent resistance to mechanical stress	Depend on type of insulation
TEMPERATURE INDEX **HEAT SHOCK**	≥ 200 °C ≥ 220 °C	≥ 200 °C ≥ 220 °C	Depend on type of insulation Depend on type of insulation
REELS AND PACKAGING	www.dahrengroup.com		

Note! For more information regarding other insulations and materials please contact us.
Hollow conductors are offered in co-operation with a partner, Dahrén Group will add enamel and/or tape.

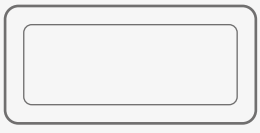
Conductor shapes

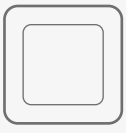

Rectangular with round hole


Square with round hole


Rectangular with oval hole

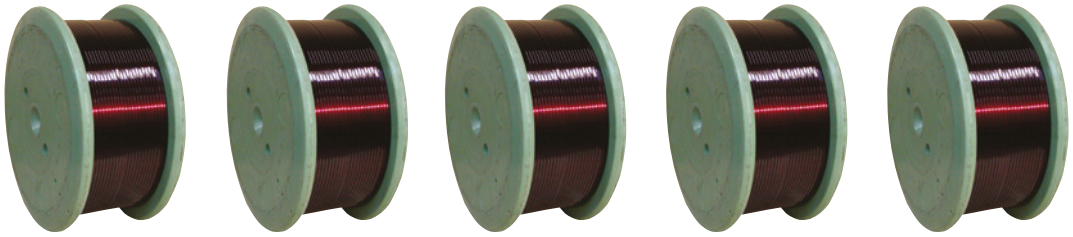

Round with round hole


Rectangular with uniform wall thickness


Square with square hole

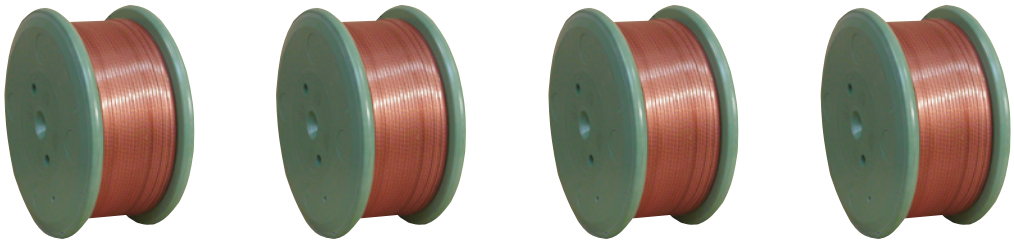

Rectangular with non uniform wall thickness

Rectangular enamelled copper wire



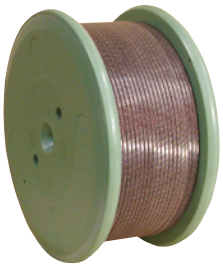
	Damid 200	Damid 220	Damid 240	Damid CR	Damidbond 200
CLASS	200	220	240	200	200
STANDARD	IEC 60317-29	IEC 60317-58	IEC 60317-58	IEC 60317-13	IEC 60317-29 + internal Dahrén standard
INSULATION	Polyesterimide, overcoated with polyamide-imide	Basecoat: Polyamide-imide	Basecoat: Polyimide	THEIC-modified polyesterimide, overcoated with polyamide-imide	Polyesterimide, overcoated with polyamide-imide, with a bonding layer
UL APPROVAL	E101843	Not approved	Not approved	E101843	E101843
DIMENSION RANGE	Please see www.dahrengroup.com/productsheets				
PROPERTIES	High heat resistance. Very good resistance to transformer oils. Very good resistance to typical solvent. Freon resistant. Excellent resistance to mechanical stress.	High heat resistance. Very good resistance to transformer oils. Very good resistance to typical solvent. Freon resistant. Excellent resistance to mechanical stress.	High heat resistance. Very good resistance to transformer oils. Very good resistance to typical solvent. Freon resistant. Excellent resistance to mechanical stress. High values for PDIV. PD occurs at a higher voltage level than for standard wire.	Excellent corona effect resistance. High cut-through temperature. Very good heat resistance. Very good mechanical resistance.	High heat resistance. Very good resistance to transformer oils. Very good resistance to typical solvent. Bondable at 180°C–220°C. High re-softening temperature.
TEMPERATURE INDEX **HEAT SHOCK**	≥ 200 °C ≥ 220 °C	≥ 220 °C ≥ 240 °C	≥ 240 °C ≥ 260 °C	≥ 200 °C ≥ 220 °C	≥ 200 °C ≥ 220 °C
REELS AND PACKAGING	www.dahrengroup.com				
OTHER		On request	On request	On request	On request

Rectangular covered copper wire



	Dafibre 155	Dafibre 180	Dafibre EP 155	Dafibre EP 180
CLASS	155	180	155	180
STANDARD	IEC 60317-32	IEC 60317-31	IEC 60317-32 + internal Dahrén standard	IEC 60317-31 + internal Dahrén standard
INSULATION	1–3 layers of glassfibre yarn, impregnated with polyurethane varnish	1–3 layers of glassfibre yarn, impregnated with polyester-imide varnish	1–2 layers of glassfibre yarn, impregnated with polyurethane varnish, coated with a layer of semi-cured epoxy	1–2 layers of glassfibre yarn, impregnated with polyester-imide varnish, coated with a layer of semi-cured epoxy
UL APPROVAL	Not approved	Not approved	Not approved	Not approved
DIMENSION RANGE	Please see www.dahrengroup.com/productsheets			
PROPERTIES	Excellent resistance to mechanical stress.	Excellent resistance to mechanical stress.	Excellent resistance to mechanical stress. B-stage cured epoxy layer allows pre-pressing of windings.	Excellent resistance to mechanical stress. B-stage cured epoxy layer allows pre-pressing of windings.
TEMPERATURE INDEX **HEAT SHOCK**	≥ 155 °C ≥ 175 °C	≥ 180 °C ≥ 200 °C	≥ 155 °C ≥ 175 °C	≥ 180 °C ≥ 200 °C
REELS AND PACKAGING	www.dahrengroup.com			
OTHER			On request	On request

Rectangular covered copper wire

	Damidfibre 155	Damidfibre 180	Damidfibre EP 155	Damidfibre EP 180
CLASS	155	180	155	180
STANDARD	IEC 60317-32	IEC 60317-31	IEC 60317-32 + Internal Dahrén standard	IEC 60317-31 + Internal Dahrén standard
INSULATION	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide, covered with 1–2 layers of glassfibre yarn, impregnated with polyurethane varnish	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide, covered with 1–2 layers of glassfibre yarn, impregnated with polyester-imide varnish	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide, covered with 1–2 layers of glassfibre yarn, impregnated with polyurethane varnish, coated with a layer of semi-cured epoxy	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide, covered with 1–2 layers of glassfibre yarn, impregnated with polyester-imide varnish, coated with a layer of semi-cured epoxy
UL APPROVAL	Not approved	Not approved	Not approved	Not approved
DIMENSION RANGE	Please see www.dahrengroup.com/productsheets			
PROPERTIES	Excellent resistance to mechanical stress. Heat resistant.	Excellent resistance to mechanical stress. Heat resistant.	Excellent resistance to mechanical stress. B-stage cured epoxy layer allows pre-pressing of windings.	Excellent resistance to mechanical stress. B-stage cured epoxy layer allows pre-pressing of windings.
TEMPERATURE INDEX	≥ 155 °C	≥ 180 °C	≥ 155 °C	≥ 180 °C
HEAT SHOCK	≥ 175 °C	≥ 200 °C	≥ 175 °C	≥ 200 °C
REELS AND PACKAGING	www.dahrengroup.com			
OTHER			On request	On request

Rectangular covered copper wire

	Daroglas 155	Damidoglas 155	Damidoglas 200
CLASS	155	155	200
STANDARD	IEC 60317-60	IEC 60317-60	IEC 60317-62
INSULATION	1–2 layers of polyester-glassfibre yarn	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide, covered with 1–2 layers of polyester-glassfibre yarn	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide, covered with 1–2 layers of polyester-glassfibre yarn
UL APPROVAL	Not approved	Not approved	Not approved
DIMENSION RANGE	Please see www.dahrengroup.com/productsheets		
PROPERTIES	Excellent resistance to mechanical stress. Very good adhesion to conductor.	Excellent resistance to mechanical stress. Very good adhesion to conductor.	Excellent resistance to mechanical stress. Very good adhesion to conductor.
TEMPERATURE INDEX	≥ 155 °C	≥ 155 °C	≥ 200 °C
HEAT SHOCK	≥ 175 °C	≥ 175 °C	≥ 220 °C
REELS AND PACKAGING	www.dahrengroup.com		

Rectangular covered copper wire

	Damic	Damidomic
CLASS	155	155
STANDARD	Internal Dahrén standard	Internal Dahrén standard
INSULATION	Wrapped with 1–4 layers of mica tape. (Calcined muscovite on PET-carrier impregnated with epoxy)	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide. Wrapped with 1–4 layers of mica tape. (Calcined muscovite on PET-carrier impregnated with epoxy)
UL APPROVAL	Not approved	Not approved
DIMENSION RANGE	Please see www.dahrengroup.com/productsheets	
PROPERTIES	Very good resistance to partial discharges.	Very good resistance to partial discharges.
TEMPERATURE INDEX	≥ 155 °C	≥ 155 °C
HEAT SHOCK	≥ 175 °C	≥ 175 °C
REELS AND PACKAGING	www.dahrengroup.com	

Rectangular covered copper wire

	Dakap	Dakap CR
CLASS	240	240
STANDARD	Internal Dahrén standard	Internal Dahrén standard
INSULATION	Wrapped with 1–2 layers of Teflon coated polyimide foil. Bonded to conductor by sintering of Teflon coat	Wrapped with 1 layer of Teflon coated polyimide foil. Bonded to conductor by sintering of Teflon coat
UL APPROVAL	Not approved	Not approved
DIMENSION RANGE	Please see www.dahrengroup.com/productsheets	
PROPERTIES	Excellent thermal resistance. Excellent resistance to humidity.	Outstanding thermal resistance. Excellent resistance to humidity. Very good resistance to partial discharges.
TEMPERATURE INDEX	≥ 240 °C	≥ 240 °C
HEAT SHOCK	≥ 260 °C	≥ 260 °C
REELS AND PACKAGING	www.dahrengroup.com	

Al ● Round enamelled aluminium wire

	Damid 200 Al
CLASS	200
STANDARD	IEC 60317-25
INSULATION	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide
UL APPROVAL	E101843
DIMENSION RANGE/MM	
GRADE 1	1.25 – 5.00
GRADE 2	1.25 – 5.00
GRADE 3	1.25 – 5.00
PROPERTIES	High heat resistance. Suitable in lightweight designs. Very good resistance to transformer oils. Very good resistance to typical solvent. Freon resistant.
TEMPERATURE INDEX	≥ 200 °C
HEAT SHOCK	≥ 220 °C
CUT-THROUGH	≥ 320 °C
REELS AND PACKAGING	www.dahrengroup.com
OTHER	Above 5.0 mm upon request

Al Technical data aluminium wire

Damid 200 Al according to IEC 60317-0-3

NOMINAL CONDUCTOR DIAMETER	CONDUCTOR TOLERANCE +/–	GRADE 1		GRADE 2		LENGTH (M/KG)		AREA MM²	RESISTANCE 20°C Ω/M
		MIN INCREASE	MAX OVERALL DIAMETER	MIN INCREASE	MAX OVERALL DIAMETER	GRADE 1	GRADE 2	NOMINAL	NOMINAL
1.000	0.010	—	—	0.063	1.094	—	429	0.7854	0.03552
1.060	0.011	—	—	0.065	1.157	—	382	0.8825	0.03161
1.120	0.011	—	—	0.065	1.217	—	344	0.9852	0.02831
1.180	0.012	—	—	0.067	1.279	—	311	1.094	0.02551
1.250	0.013	—	—	0.067	1.349	—	279	1.227	0.02273
1.320	0.013	—	—	0.069	1.422	—	250	1.368	0.02038
1.400	0.014	—	—	0.069	1.502	—	223	1.539	0.01812
1.500	0.015	—	—	0.071	1.606	—	195	1.767	0.01578
1.600	0.016	—	—	0.071	1.706	—	172	2.011	0.01387
1.700	0.017	—	—	0.073	1.809	—	153	2.270	0.01229
1.800	0.018	—	—	0.073	1.909	—	137	2.545	0.01096
1.900	0.019	—	—	0.075	2.012	—	123	2.835	0.009838
2.000	0.020	—	—	0.075	2.112	—	111	3.142	0.008879
2.120	0.021	—	—	0.077	2.235	—	99	3.530	0.007902
2.240	0.022	—	—	0.077	2.355	—	89	3.941	0.007078
2.360	0.024	—	—	0.079	2.478	—	80	4.374	0.006377
2.500	0.025	—	—	0.079	2.618	—	72	4.909	0.005683
2.650	0.027	—	—	0.081	2.772	—	64	5.515	0.005057
2.800	0.028	—	—	0.081	2.922	—	58	6.158	0.004530
3.000	0.030	0.045	3.083	0.084	3.126	51	50	7.069	0.003946
3.150	0.032	0.045	3.233	0.084	3.276	46	46	7.793	0.003579
3.350	0.034	0.046	3.435	0.086	3.479	41	40	8.814	0.003165
3.550	0.036	0.046	3.635	0.086	3.679	37	36	9.898	0.002818
3.750	0.038	0.047	3.838	0.089	3.883	33	32	11.04	0.002526
4.000	0.040	0.047	4.088	0.089	4.133	29	29	12.57	0.002220
4.250	0.043	0.049	4.341	0.092	4.387	26	25	14.19	0.001966
4.500	0.045	0.049	4.591	0.092	4.637	23	23	15.90	0.001754
4.750	0.048	0.050	4.843	0.094	4.891	20	20	17.72	0.001574
5.000	0.050	0.050	5.093	0.094	5.141	19	18	19.63	0.001421
5.250*	0.053	0.053	5.346	0.096	5.395	17	17	21.65	0.001288
5.300*	0.053	0.053	5.393	0.096	5.443	16	16	22.06	0.001264
5.500*	0.055	0.053	5.600	0.096	5.645	15	15	23.76	0.001174
5.600*	0.056	0.056	5.703	0.098	5.748	15	15	24.63	0.001133

Note! * Not IEC standard

The technical data included is up to date at the time of printing.

Dahrén reserve the right to make any amendments deemed necessary.

Rectangular enamelled aluminium wire

	Damid 200 Al
CLASS	200
STANDARD	IEC 60317-73
INSULATION	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide
UL APPROVAL	E101843
DIMENSION RANGE	Please see www.dahrengroup.com/productsheets
PROPERTIES	High heat resistance. Allows lightweight designs. Very good resistance to transformer oil. Very good resistance to typical solvent. Freon resistant.
TEMPERATURE INDEX	≥ 200 °C
HEAT SHOCK	≥ 220 °C
REELS AND PACKAGING	www.dahrengroup.com

Rectangular covered aluminium wire

	Dafibre 155 AI	Dafibre 180 AI
CLASS	155	180
STANDARD	Internal Dahrén standard	Internal Dahrén standard
INSULATION	1–3 layers of glassfibre yarn, impregnated with polyurethane varnish	1–3 layers of glassfibre yarn, impregnated with polyester-imide varnish
UL APPROVAL	Not approved	Not approved
DIMENSION RANGE	Please see www.dahrengroup.com/productsheets	
PROPERTIES	Excellent resistance to mechanical stress. Suitable in lightweight designs.	Excellent resistance to mechanical stress. Suitable in lightweight designs.
TEMPERATURE INDEX	≥ 155 °C	≥ 180 °C
HEAT SHOCK	≥ 175 °C	≥ 200 °C
REELS AND PACKAGING	www.dahrengroup.com	

Rectangular covered aluminium wire

	Damidfibre 155 AI	Damidfibre 180 AI
CLASS	155	180
STANDARD	Internal Dahrén standard	Internal Dahrén standard
INSULATION	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide, covered with 1–2 layers of glassfibre yarn, impregnated with polyurethane varnish	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide, covered with 1–2 layers of glassfibre yarn, impregnated with polyester-imide varnish
UL APPROVAL	Not approved	Not approved
DIMENSION RANGE	Please see www.dahrengroup.com/productsheets	
PROPERTIES	Excellent resistance to mechanical stress. Heat resistant.	Excellent resistance to mechanical stress. Heat resistant.
TEMPERATURE INDEX	≥ 155 °C	≥ 180 °C
HEAT SHOCK	≥ 175 °C	≥ 200 °C
REELS AND PACKAGING	www.dahrengroup.com	

Rectangular covered aluminium wire

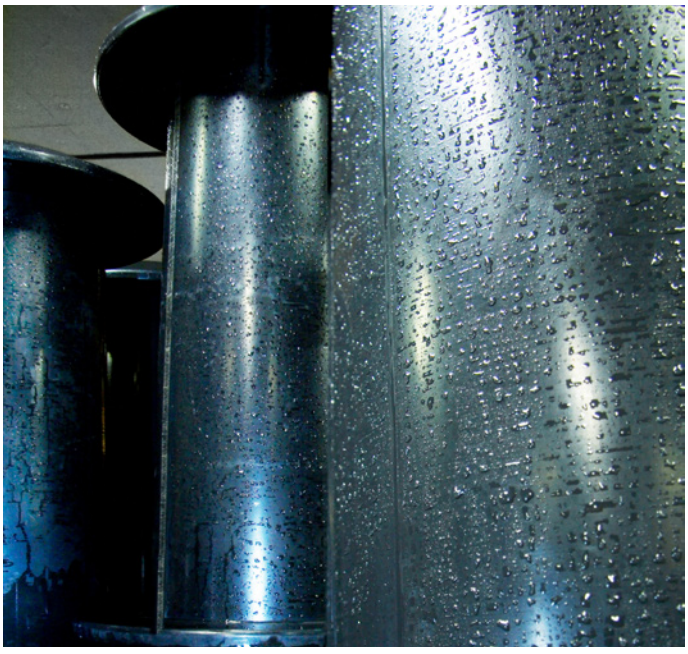
	Daroglas 155 Al	Damidoglas 155 Al
CLASS	155	155
STANDARD	Internal standard	Internal standard
INSULATION	1–2 layers of polyester-glassfibre yarn	THEIC-modified polyester or polyesterimide, overcoated with polyamide-imide, covered with 1–2 layers of polyester-glassfibre yarn
UL APPROVAL	Not approved	Not approved
DIMENSION RANGE	Please see www.dahrengroup.com/productsheets	
PROPERTIES	Excellent resistance to mechanical stress. Very good adhesion to conductor.	Excellent resistance to mechanical stress. Very good adhesion to conductor.
TEMPERATURE INDEX	≥ 155 °C	≥ 155 °C
HEAT SHOCK	≥ 175 °C	≥ 175 °C
REELS AND PACKAGING	www.dahrengroup.com	

Overview rectangular products

	PROCESS INSULATION MATERIAL CLASS CONDUCTOR	ENAMELLING 200/220/240	GLASS LAPPING GLASS YARN 155/180	MIXED YARN LAPPING GLASS-POLYESTER 155	TAPE WRAPPING PET/MICA 155	TAPE WRAPPING KAPTON® (CR) 240
	**Bare Cu conductor**		**Dafibre**	**Daroglas**	**Damic**	**Dakap (CR)**
		**Damid Damidbond**	**Damidfibre**	**Damidoglas** also available in 200	**Damidomic**	
	**Bare Al conductor**		**Dafibre Al**	**Daroglas Al**		
		**Damid Al**	**Damidfibre Al**	**Damidoglas Al**		

Handled with care

We regard packaging as an integral element of the manufacturing process to ensure that the wire reaches your production line in perfect condition. Packaging also plays a part in our environmental system; all packaging is recycled, cleaned and returned to our production units.



At Dahrén we are proud to be the industry leader when it comes to minimizing our production's environmental impact. Discharge of copper or aluminium into water supplies is minimized and all excess energy from our production is re-used to heat our premises. We continously work with all details in our organisation, striving to minimize our carbon footprint. Our solvent emissions are far below EU directives, the copper and aluminium waste are 100 % recycled and all our packing is re-used.

dahrengroup.com →

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