



Essex® Fine Wire Products

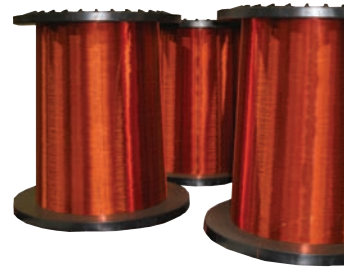


World-Class Quality.

Responsive Service.

Innovative Solutions.

Essex[®] Fine Wire Products



At Superior Essex, we pride ourselves on being the global leader in the design, manufacture, and distribution of magnet wire / winding wire. We are the world's largest producer of magnet wire used by major original equipment manufacturers and distributors. Because of this, we are able to provide innovative solutions to specifically meet your fine wire needs.

VERTICALLY INTEGRATED

Vertical integration means the advantage of controlling the entire manufacturing process. We have an in-house chemical processing facility which supplies our magnet wire plants with a majority of our high quality enamels. Not only do we make a majority of our own enamels, we have the flexibility to develop custom insulations. Our in-house metals processing plants supply the high-grade copper product to our facilities. This combined vertical integration gives us the flexibility and responsiveness to manufacture a quality, consistent magnet wire product.



LEAN, SIX SIGMA METHODOLOGY

We are committed to creating a high performance based culture. We are focused on delivering value to our customers by offering the best quality products and most innovative solutions in a timely manner. We are ISO 9002 and TS-16949 certified. A comprehensive Six Sigma, Lean Process has been successfully deployed through our organization. Using Six Sigma Methodology, we have been able to significantly accelerate our new product development process. By implementing Lean Principles, we have significantly reduced our lead times and enhanced our customer service levels. The end result ensures a consistent, quality product with superior customer service.

DESIGN AND BUILD TO YOUR NEEDS

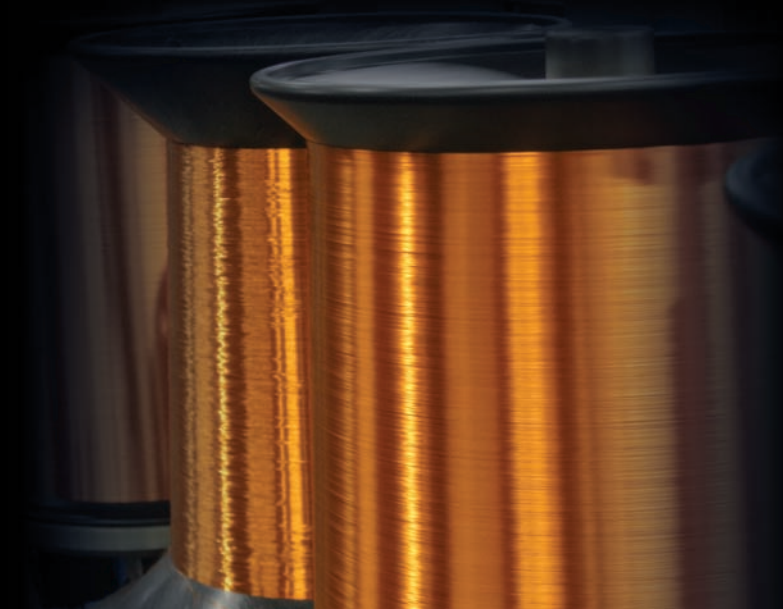
We understand that your product applications can be complicated. We have the expertise and knowledge to provide solutions to your most demanding applications. Our in-house Technical Services Group will work with you to design and develop products that meet your specific requirements. We can provide expert custom design assistance to meet your application needs precisely – from new product design to process improvements to laboratory research at our Magnet Wire Testing Lab in Fort Wayne.

With manufacturing facilities in North America, Europe, and Asia Pacific, we have the global reach and expertise to provide the high quality magnet wire products and service you require.



Magnet Wire / Winding Wire Manufacturing Facilities

A Global Presence



Essex® Fine Wire Products

Thermal Class	Essex® Brand Name	NEMA Designation	IEC Designation	UL Recognized	Insulation
105°C	Formvar	MW 15-C/A	60317-1, 60317-14	No	Polyvinyl Formal
105°C	Soderbond®	MW 3	60317-2	No	Polyurethane with a Self Bonding Overcoat
155°C	Soderon®/155	MW 80	60317-21	Yes	Polyurethane/Polyamide
155°C	Soderex®/155	MW 79	60317-20	Yes	Polyurethane
180°C	Soderon®/180	MW 83	60317-55	Yes	Polyurethane/Polyamide
180°C	Soderex®/180	MW 82	60317-51	Yes	Polyurethane
180°C	Solidex®	MW 77	60317-23	Yes	Soderable Polyester
180°C	Solidon®	MW 78	-	Yes	Soderable Polyester/Polyamide
180°C	Polybondex®	<i>Reference NEMA MW 1000 for dimensional data only</i>	-	Yes	Modified Polyester/ Polyamideimide/Bondcoat
200°C	GP/MR-200®	MW 35-C/A MW 73-C/A	60317-13, 60317-25	Yes	Modified Polyester / Polyamideimide
200°C	Thermalex 200®	MW 74-C/A	60317-15, 60317-42	Yes	Modified Polyester
220°C	AI	MW 81	60317-26	Yes	Polyamideimide
240°C	Alex®	MW 16	60317-46	Yes	Polyimide

Special colors available upon request. Aluminum available up to 30 AWG on select products.

Essex® Fine Wire Handling Suggestions

To ensure the best performance with Essex® fine wire, please be sure to exert special care when handling. We suggest the following guidelines:

DURING INCOMING SHIPMENTS

- ✓ All incoming shipments should be checked for damage during transportation. If damage is detected, please contact freight carrier.
- ✓ When using a fork lift or hand cart, be careful not to bump or penetrate the outside of the cartons as this may damage the magnet wire.

DURING WIRE STORAGE

- ✓ Avoid double stacking the wire pallets.
- ✓ Store cartons on their original pallets and keep unused spools safely stored in their original cartons until needed. Store the wire carton in a dry, non-corrosive location. Keep the wire protected from dust and other contaminants.
- ✓ Do not stack different sizes of spools together or near each other; the spool flanges may rub against the wire and cause nicks or dents.

Standard Product Color	Characteristics	Applications
Gold	Excellent flexibility, adhesion, and abrasion scrape resistance.	Oil-filled transformers, motors, solenoids, good thermal shock resistance.
Red	Excellent bond strength at room temperature.	Helical and toroidal coils, solenoid coils, voice coils.
Red	Same characteristics as Soderex with the advantages of a nylon topcoat. The nylon topcoat helps provide improvement in the windability and tolerates more severe winding operations.	Appliance motors, relays, timers and clock coils, encapsulated coils.
Red	Polyurethane insulation allows soldering without prior removal of the film from the wire. Excellent resistance to moisture and most common solvents.	Small motors, relays, electronic coils.
Red & Green	High thermal resistance and low soldering temperatures.	Bobbin wound and paper section coils, molded and encapsulated coils, small motors, armatures and fields, automotive coils, toroidal coils, specialty power transformers.
Red	Designed for applications requiring both high thermal resistance and low soldering temperatures.	Relays, automotive coils, specialty power transformers, encapsulated coils.
Natural	Soderability is coupled with a need for high thermal resistance.	Specialty power transformers, shaded pole motor coils, automotive coils, electronic coils.
Natural	Soderability is coupled with a need for high thermal resistance. Enhanced by addition of a polyamide overcoat.	Shaded pole motor coils, special control coils, automotive coils.
Gold	Different constructions of bondable wire having a GP/MR-200® or Thermalex 200® base insulation with a thermoplastic bondcoat. Bondcoat allows the use of resistance, induction, or radiant heating to flow the bond.	Clutch and brake coils, helical and toroidal coils, motor field coils, deflection yoke coils.
Natural	Standard of excellence for motor repair with high moisture resistance and ease of insertion. Film insulation has physical toughness, excellent dielectric properties, and superior chemical resistance to common solvents and refrigerants.	Fractional and integral horsepower motors (hermetic and open), automotive and power tool motors, general purpose motors, dry-type transformers, large coil applications, electronic coils.
Natural	Thermally stable, modified polyester film and has excellent physical, chemical and electrical properties for small coils operating at high temperatures.	Small appliance and power tool motors, continuous operation coils, encapsulated coils, sub-fractional instrument and servo-motors.
Green	Provides unsurpassed scrape and abrasion resistance. The combination of high moisture and chemical resistance makes it suited for the most demanding of applications.	Fractional and integral horsepower motors, high temperature continuous duty coils and relays, hermetic and sealed units, heavy duty hand tool motors, encapsulated coils. Excellent moisture and chemical resistance.
Natural	Exceptional resistance to chemical solvents and burn-out; outstanding thermoplastic flow and ability to withstand excessive overloads in extreme conditions.	Fractional and integral horsepower motors, high temperature continuous duty coils and relays, hermetic and sealed units, heavy duty hand tool motors, encapsulated coils.

DURING WIRING HANDLING

- ✓ Do not stack spools outside of the original Essex box or carton.
- ✓ When removing spools from the carton or package, completely bend all lids and flaps away from the spools.
- ✓ To protect the wire enamel, do not remove the spool wrapper until ready to load the spool onto the winding equipment. Use extreme caution when removing the tape from the wrapper and place wrappers back in cartons for reuse.
- ✓ Care should be taken when handling spools near jewelry, metal objects, or chemicals; contact may damage the wire enamel.
- ✓ Avoid placing your fingers too far into the carton handling slots; contact may damage the wire enamel.
- ✓ Carry the spools by using the provided hand holes or handles.

DURING MANUFACTURING PROCESS

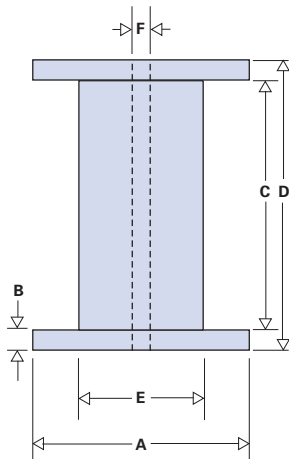
- ✓ Check top flanges for any damage; use very fine grit sand paper to remove minor nicks on the flanges.
- ✓ If the spool is to be returned to its original carton for later usage, please secure the loose end by tying it to the flange.
- ✓ Keep the spool as straight as possible when inserting into a payoff shroud.
- ✓ Maintain proper tension control during wire payoff.

DURING WIRE RETURNS

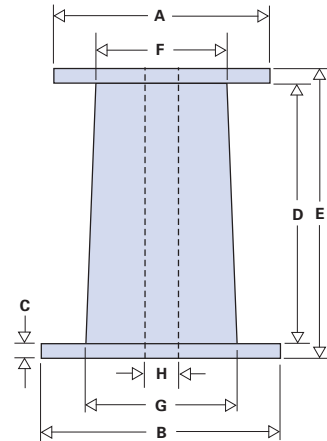
- ✓ If the magnet wire must be returned, use original Essex packaging materials and identify the cause for the return on the spool flange.

Essex® Fine Wire Packaging Reference Guide

Straight Flange / Barrel



Straight Flange / Tapered Barrel



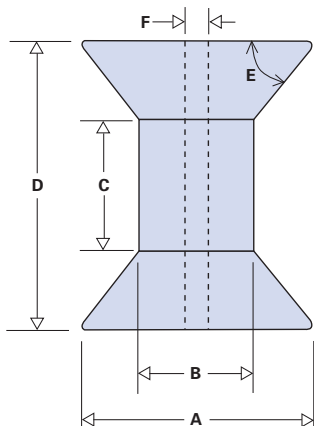
Package	Pkg Code	Package Design	Size - Copper	Size - Aluminum	Dimensions (inches)								Nom. Pounds Per Spool-Copper	Number of Spools/Reels Per Carton	Number of Containers per Pallet
					A	B	C	D	E	F	G	H			
DIN 125/45	07	Taper Flange/Straight Barrel	35-47	*	4.921	2.795	2.559	4.921	45°	0.630	-	-	4.5	8	15
6" x 3 1/2" Spool Box	06	Straight Flange/Barrel	28-47	*	6.000	0.408	3.500	4.32	3.500	0.630	-	-	8.5	6	30
6" x 3 1/2" Spool Bulk Pack	76	Straight Flange/Barrel	28-47	*	6.000	0.408	3.500	4.32	3.500	0.630	-	-	8.5	6	42
6" x 6" Spool Box	05	Straight Flange/Barrel	28-47	*	6.000	0.516	5.968	7	3.750	0.630	-	-	12.0	4	20
6" x 6" Spool Bulk Pack	75	Straight Flange/Barrel	28-47	*	6.000	0.516	5.968	7	3.750	0.630	-	-	12.0	6	30
DIN 160/45 Spool	10	Taper Flange/Straight Barrel	37-47	*	6.299	3.543	3.346	6.299	45°	0.630	-	-	13.5	4	30
DIN 200/45 Spool	11	Taper Flange/Straight Barrel	29-44	*	7.874	4.409	4.173	7.874	45°	0.630	-	-	23.0	2	18
HKL 200/22*	42	Taper Flange/Straight Barrel	*	*	7.874	4.4094	8.701	12.402	45°	0.866	-	-	35.0	1	12
8 1/2" x 9 1/4" Taper Reel	08	Straight Flange/Tapered Barrel	28-39	*	8.500	9.250	0.521	9.000	10.0625	5.500	6.500	1.531	40.0	1	16
DIN 250/45*	40	Taper Flange/Straight Barrel	*	*	9.843	5.512	5.236	9.843	45°	0.630	-	-	50.0	1	28
Taper Flange TF 80	13	Tapered Flange/Tapered Barrel	28-37	*	10.000	10.875	6.000	6.800	12.634	8.230	45°	1.531	75.0	1	12
Taper Flange TF 80 (Box)	81	Tapered Flange/Tapered Barrel	28-37	*	10.000	10.875	6.000	6.800	12.634	8.230	45°	1.531	75.0	1	12
Reel-Pak 250*	25	Straight Flange/Tapered Barrel	*	*	15.000	16.000	1.218	12.000	14.375	7.960	9.000	1.531	260.0	1	5

Essex has the capabilities to match spool weights to fit your application requirements.

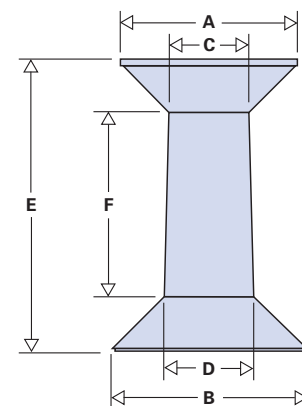
*Available upon special request, please consult Magnet Wire Marketing for more information.

Note: Aluminum nominal pounds per spool information available upon special request.

Taper Flange / Straight Barrel



Tapered Flange / Tapered Barrel



Engineering Data for Round, Copper Film Coated Wire

AWG SIZE	Bare Wire Diameter						SINGLE BUILD DIMENSIONS				HEAVY BUILD DIMENSIONS			
							Increase in Diameter Due to Film Coating		Overall Diameter of Film Coated Wire		Increase in Diameter Due to Film Coating		Overall Diameter of Film Coated Wire	
	Minimum		Nominal		Maximum		Minimum		Maximum		Minimum		Maximum	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
30	0.0099	0.251	0.0100	0.254	0.0101	0.257	0.0007	0.018	0.0112	0.285	0.0013	0.033	0.0121	0.307
30 1/2	0.0094	0.239	0.0095	0.241	0.0096	0.244	0.0006	0.015	0.0106	0.270	0.0013	0.033	0.0114	0.291
31	0.0088	0.224	0.0089	0.226	0.0090	0.229	0.0006	0.015	0.0100	0.255	0.0012	0.030	0.0108	0.275
31 1/2	0.0083	0.211	0.0084	0.213	0.0085	0.216	0.0006	0.015	0.0095	0.242	0.0012	0.030	0.0103	0.261
32	0.0079	0.201	0.0080	0.203	0.0081	0.206	0.0006	0.015	0.0090	0.229	0.0011	0.028	0.0097	0.247
32 1/2	0.0074	0.188	0.0075	0.191	0.0076	0.193	0.0005	0.013	0.0085	0.216	0.0011	0.028	0.0092	0.234
33	0.0070	0.178	0.0071	0.180	0.0072	0.183	0.0005	0.013	0.0081	0.205	0.0010	0.025	0.0087	0.222
33 1/2	0.0066	0.168	0.0067	0.170	0.0068	0.173	0.0005	0.013	0.0076	0.194	0.0010	0.025	0.0083	0.210
34	0.0062	0.157	0.0063	0.160	0.0064	0.163	0.0005	0.013	0.0072	0.183	0.0009	0.023	0.0078	0.199
34 1/2	0.0058	0.147	0.0059	0.150	0.0060	0.152	0.0004	0.010	0.0068	0.174	0.0009	0.023	0.0074	0.188
35	0.0055	0.140	0.0056	0.142	0.0057	0.145	0.0004	0.010	0.0065	0.164	0.0009	0.023	0.0070	0.178
35 1/2	0.0052	0.132	0.0053	0.135	0.0054	0.137	0.0004	0.010	0.0061	0.156	0.0008	0.020	0.0066	0.169
36	0.0049	0.124	0.0050	0.127	0.0051	0.130	0.0004	0.010	0.0058	0.147	0.0008	0.020	0.0063	0.160
36 1/2	0.0046	0.117	0.0047	0.119	0.0048	0.122	0.0004	0.010	0.0055	0.139	0.0007	0.018	0.0060	0.152
37	0.0044	0.112	0.0045	0.114	0.0046	0.117	0.0004	0.010	0.0052	0.132	0.0007	0.018	0.0057	0.144
37 1/2	0.0041	0.104	0.0042	0.107	0.0043	0.109	0.0003	0.008	0.0049	0.125	0.0007	0.018	0.0054	0.136
38	0.0039	0.099	0.0040	0.102	0.0041	0.104	0.0003	0.008	0.0047	0.118	0.0007	0.018	0.0051	0.129
38 1/2	0.0036	0.091	0.0037	0.094	0.0038	0.097	0.0003	0.008	0.0044	0.112	0.0006	0.015	0.0048	0.122
39	0.0034	0.086	0.0035	0.089	0.0036	0.091	0.0003	0.008	0.0042	0.106	0.0006	0.015	0.0045	0.116
39 1/2	0.0032	0.081	0.0033	0.084	0.0034	0.086	0.0003	0.008	0.0039	0.100	0.0006	0.015	0.0043	0.109
40	0.0030	0.076	0.0031	0.079	0.0032	0.081	0.0003	0.008	0.0037	0.095	0.0005	0.013	0.0041	0.104
40 1/2	0.0029	0.074	0.0030	0.076	0.0031	0.079	0.0003	0.008	0.0035	0.090	0.0005	0.013	0.0039	0.098
41	0.0027	0.069	0.0028	0.071	0.0029	0.074	0.0003	0.008	0.0033	0.085	0.0005	0.013	0.0037	0.093
41 1/2	0.0025	0.064	0.0026	0.066	0.0027	0.069	0.0002	0.005	0.0032	0.080	0.0005	0.013	0.0035	0.088
42	0.0024	0.061	0.0025	0.064	0.0026	0.066	0.0002	0.005	0.0030	0.076	0.0005	0.013	0.0033	0.083
42 1/2	0.0023	0.058	0.0024	0.061	0.0025	0.064	0.0002	0.005	0.0028	0.072	0.0005	0.013	0.0031	0.079
43	0.0021	0.053	0.0022	0.056	0.0023	0.058	0.0002	0.005	0.0027	0.068	0.0004	0.010	0.0029	0.075
43 1/2	0.0020	0.051	0.0021	0.053	0.0022	0.056	0.0002	0.005	0.0025	0.065	0.0004	0.010	0.0028	0.071
44	0.0019	0.048	0.0020	0.051	0.0021	0.053	0.0002	0.005	0.0024	0.061	0.0004	0.010	0.0026	0.067
44 1/2	0.0018	0.046	0.0019	0.048	0.0020	0.051	0.0002	0.005	0.0023	0.058	0.0004	0.010	0.0025	0.064
45*	-	-	0.00176	0.0447	-	-	0.00020	0.005	0.00220	0.0559	0.0004	0.0010	0.0024	0.0610
46*	-	-	0.00157	0.0399	-	-	0.00020	0.005	0.00200	0.0508	0.0003	0.0076	0.0021	0.0533
47*	-	-	0.00140	0.0356	-	-	0.00010	0.0025	0.00170	0.0432	0.0003	0.0076	0.0019	0.0483

Note: Data from NEMA Standards Publication MW 1000.

*Theoretical nominal bare diameter.

For metric size information, please consult Magnet Wire Marketing.



Recommended Winding Tensions

WHOLE AWG SIZE	NEMA NOM. BARE O.D.	Maximum ^{1,2} Tension
	Inches	Grams
30	0.0100	427
31	0.0089	339
32	0.0080	274
33	0.0071	216
34	0.0063	170
35	0.0056	134
36	0.0500	107
37	0.0045	87
38	0.0040	68
39	0.0035	52
40	0.0031	41
41	0.0028	34
42	0.0025	27
43	0.0022	21
44	0.0020	17
45 ³	0.00176	13
46 ³	0.00157	11
47 ³	0.00140	9

Note: This table is offered as a guide to establishing effective winding tensions. The type of winder, payoff device, and type of coil may vary the tensions to be used. In general, use the minimum tension that provides a good winding. Some minor variations in the softness of the wire from one lot to another may also dictate minor adjustments in winding tension.

1. Using the yield strength of fully annealed wire as a point of reference, tensions beyond these may cause excessive stretching and high coil resistance.
2. Maximum recommended tensions are based upon 12,000 p.s.i. for copper and 6,400 p.s.i. for aluminum.
3. Theoretical dimensions.

Note: Start-up acceleration surge can produce tensions well in excess of running tensions and need to be taken into consideration.



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