Guangdong Jintian Copper Industry Co., Ltd.

FOR APPROVAL

Affirmation Letter

Customer Number (File No):
GDJTGG-CGB-2023-09-TY1

Customer Name: General

CUSTOMER

Supplier: Guangdong Jintian Copper Industry Co., Ltd.

Product Name: 155 Grade Direct Weldable Polyurethane Enamel Copper Round Wire PRODUCTS

Product Model:

QA-1/155 QA-2/155 QA-3/155

SPECIFIATION

Supplier Approval		Customer Approval	
"Compile"	Chen Shixu	"Compile"	
Review	Wu Zhiwang	Review	
Approve	Li Ming	Approve	
Sign/SIGNATURE:		Sign/SIGNATURE:	

Implementation Date:

valid from 2023/8/25

Product Implementation Standard of Guangdong Jintian Copper Industry Co., Ltd.

Customer Name	General customers
Product Name	155-class polyurethane enameled copper round wire
Product model	QA-1/155 QA-2/155 QA-3/155
Product standard	**GB/T 6109.10-2008 / IEC** 60317-20:2000

Revision Date	**"Compile**	**"Conference Review**	**Signature**	**Approve**	**Revision content and test basis**

Guangdong Jintian Copper Industry Co., Ltd
Product implementation standard

客户名称	通用客户	实施日期	2023/8/25
文件种类	规格书	页　次	第1页，共15页
产品名称	155级聚氨酯漆包铜圆线	修　订	第 1 版 第 0 次

1. Scope of application: This standard is applicable to the use of general customers.
155-class polyurethane enameled copper round wire

2. Temperature resistance level: 155℃

3, Product Name and Model

Name: 155-class polyurethane enameled copper round wire

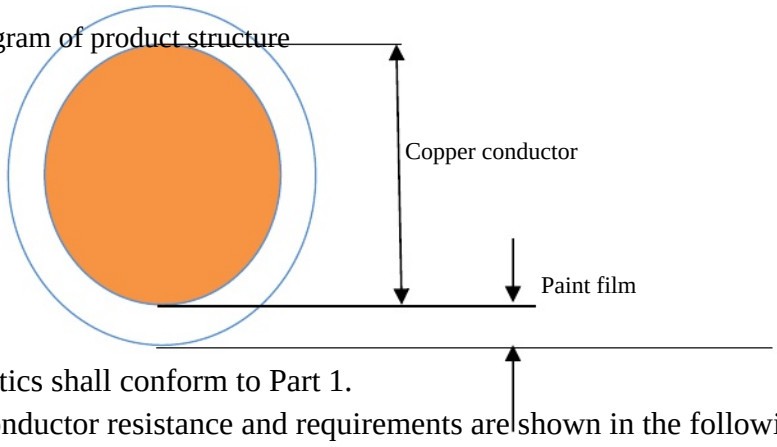
型号 Model	漆膜厚度 Paint film thickness
QA-1/155	薄漆膜 Thin paint film
QA-2/155	厚漆膜 Thick paint film
QA-3/155	加厚漆膜 Thickened paint film

4, Product Structure

4.1 The conductor shall be made of copper wire with a smooth, round surface, uniform quality and no defects as stipulated in the GB/T 3953-2009 standard.

4.2 The copper wire is coated continuously and smoothly with synthetic resin on the outside, without blistering or other impurities.

4.3. Schematic diagram of product structure



5, Features

5.1 The characteristics shall conform to Part 1.

5.2 Dimensions, conductor resistance and requirements are shown in the following table.

5. 3 The test methods and procedures shall be implemented in accordance with GB/T 4074-2008; IEC 60851:2005.

5.4 Requirements for wire coils and packaging are specified in Part 2.

6. The test and test report shall be in accordance with the requirements of Part 1 and follow the following items

1) Appearance 7) Breakdown voltage 13) Unilateral paint scraping
2) Size 8) Solvent resistance 14) Direct solderability
3) Conductor resistance 9) Thermal shock 15) Pinhole
4) Continuity of paint film 10) Softening breakdown
5) Flexibility 11) Elongation
6) Adhesiveness 12) Rebound

Part 1: (I)

Technical Requirements

Project	Test method		Technical Requirements
	Test conditions	According to the terms	
Appearance	-----	GB/T 6109. 1-2008 IEC 60317-0-1:2005	The insulating paint film should have a smooth surface and no impurity particles or other harmful substances inside.
Size	The accuracy of the micrometer is at least 0.01mm.	GB/T 4074. 2-2008 IEC 60851-2:1997	The size of the enameled wire should comply with Table 1.
Conductor resistance	The test temperature is 20℃ and the length of the sample is 1 meter.	GB/T 4074. 5-2008 IEC 60851-5:2004	Compliant with the requirements of Table 2
	The resistance of conductors is measured by Wheatstone bridge or double-arm bridge. The measured value should be converted to the value per meter at 20℃ according to the following formula. $R_{20} = \frac{R_t \times \alpha_t}{L} \times 10^3$ R20: Resistance value of 1-meter conductor at 20℃ (Ω/m) Rt: Measured resistance value at temperature t℃ (Ω) αt: Temperature conversion coefficient of conductor resistance, see Table 3. L: Test length (m)		
Continuity of paint film	When the DC voltage is set as shown in the following table, the test length is 30 meters.	GB/T 4074. 5-2008 IEC 60851-5:2004	The number of high-pressure pinholes complies with the requirements in Table 4.
Flexibility	The wire is stretched and wound on the round bar in accordance with the provisions of Table 5.	GB/T 4074. 3-2008 IEC 60851-3:1997	Use the amplification multiple shown in Table 6 to check if there is any cracking of the paint film or copper exposure on the dial.
Adhesiveness	The specimen was stretched at a rate of 2 m/s until it broke.	GB/T 4074. 3-2008 IEC 60851-3:1997	Using the amplification multiple shown in Table 6, check whether there is paint cracking and copper exposure on the surface of the watch (for those with a nominal diameter of more than 1mm, this experiment will not be conducted).
	The load weight is in accordance with Table 7, with K value = 110, and the number of twisting turns is K/d		After stripping and twisting, check if the adhesiveness is lost (for nominal diameters of 1mm and below, this test is not conducted).
Breakdown voltage	The test voltage is an AC voltage with a nominal frequency of 50Hz or 60Hz. The load weight and the number of twists shall be in accordance with Table 9, and the rate of voltage increase and the leakage current shall be as stipulated in Table 10.	GB/T 4074. 5-2008 IEC 60851-5:2004	The minimum breakdown voltage shall not be less than that shown in Table 8.
Solvent-resistant	Treated with the standard solvent for 30 ± 3 minutes at a temperature of 60 ± 3℃ and tested within 30 seconds.	GB/T 4074. 4-2008 IEC 60851-4:2005	The paint film does not crack and does not expose copper (not conducting this experiment for those with a nominal diameter of less than 0.25mm).

(1) Technical Requirements

Project	Test method		Technical Requirements
	Test conditions	According to the terms	
Thermal shock	The temperature is 175℃. According to the round bar diameters and stretching ratios shown in Table 5, the test time is 30 minutes.	GB/T 4074. 6-2008 IEC 60851-6:1996	Use the amplification multiple shown in Table 6 to check if there is any cracking of the paint film or copper exposure on the dial surface.
Softening breakdown	At 200℃, apply the load as shown in the following table and the test time is 2 minutes.	GB/T 4074. 6-2008 IEC 60851-6:1996	The paint film is not punctured and does not crack.

Diameter lower limit (mm)	Diameter upper limit (mm)	Test conditions - Load (N)
0.050	0.080	0.7
0.081	0.125	1.25
0.126	0.200	2.2
0.201	0.315	2.2
0.316	0.500	4.5
0.501	0.800	9
0.801	1.25	18
1.251	2.00	36

Elongation	The stretching speed is (5 ± 1) mm/s Elongation ☒ Lt ☒ $_{L0}$ ☒ 100% $_{L0}$ Lt: $_{Marked}$ length after $_{fracture}$ (mm) L0: Test length $_{(mm)}$	GB/T 4074. 3-2008 IEC 60851-3:1997	Compliant with the requirements of Table 11
Rebound	The diameter of the experimental round bar and the load weight shall be implemented as shown in Table 13.	GB/T 4074. 3-2008 IEC 60851-3:1997	Compliant with the requirements of Table 13 (specifications with a nominal diameter of less than 0. 08mm will not undergo this experiment)
Scratch-resistant	Single item scraper paint test	GB/T 4074. 3-2008 IEC 60851-3:1997	Compliant with the requirements of Table 12 (specifications with a nominal diameter of less than 0. 25mm will not undergo this experiment)

Product Execution Standard of Guangdong Jintian Copper Industry Co., Ltd.

Customer Name	General customers	**Implementation date**	August 25th, 2023
File types	Specification sheet	**Page**	**Page** 4 of 15
Product Name	155-class polyurethane enameled copper round wire	**Repair Order**	Version 1, Release 0

(1) Technical Requirements

Project	Test method		Technical Requirements
	Test conditions	According to the terms	
Soldering	The test temperature is 390 ± 5℃. The maximum soldering time is equal to the nominal diameter multiplied by the following multiple. If the resulting value is less than 2 seconds, the result is 2 seconds.	GB/T 4074. 4-2008 IEC 60851-4:2005	The surface of the tin-plated wire should be smooth, without pinholes and paint film residue.
	Paint film thickness: Thin paint film / Thick paint film		
	Maximum soldering time: 8d / 12d		
	d is the nominal diameter		
Pinhole	Take a sample with a length of 6 meters, immerse it in a sodium chloride phenolphthalein solution with a concentration of 2g/L, with an effective length of 5 meters. The test voltage is 12V and the test time is 1 minute.	GB/T 4074. 5-2008 IEC 60851-5:2004	The test specimens have no through holes.
	Paint film thickness: Thin paint film / Thick paint film		
	Maximum number of pinholes: 5 / 3		

(II) Inspection Rules

1.2.1 Factory Inspection

The factory inspection items are all the items in the technical requirements except for solvent resistance.

1.2.2 Type Test

The type test items are all the items in the technical requirements.

1.2.3 Inspection Methods

Arbitrary sampling is conducted on each product corresponding to each purchase order for factory inspection.

The inspection data shall be archived and the report shall be provided to the buyer along with the product.

The product undergoes type tests once a year by entrusting professional third-party testing institutions.

Part 2:

2.1 Identification and Packaging

2.1.1 The products shall be delivered neatly and closely wound on the wire reel. There shall be no more than one section of wire on each reel.

2.1.2 Spire specification: According to customer requirements.

2.2Product Logo

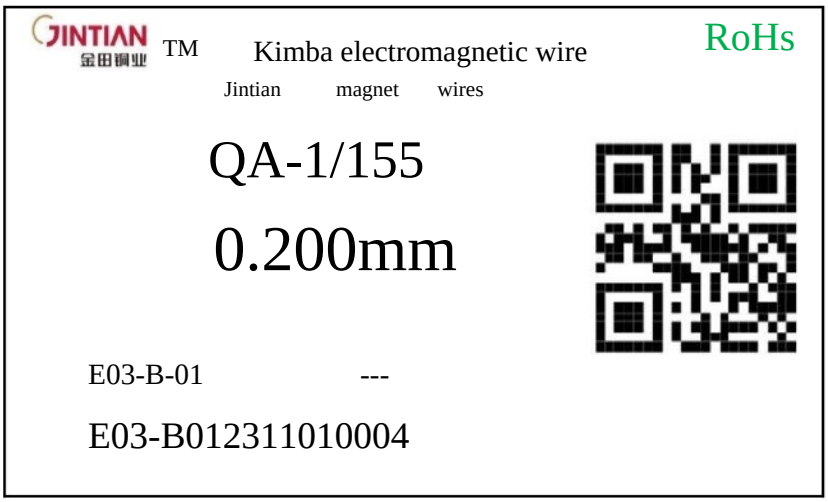
2.2.1 Make the following marks on the online shaft and outer packaging

a) Manufacturer; b) Product model and specification;

c) Weight of the product: gross weight, net weight; d) Batch number of the product

(e) Production license number.

2.2.2 Production Label



Packaging label

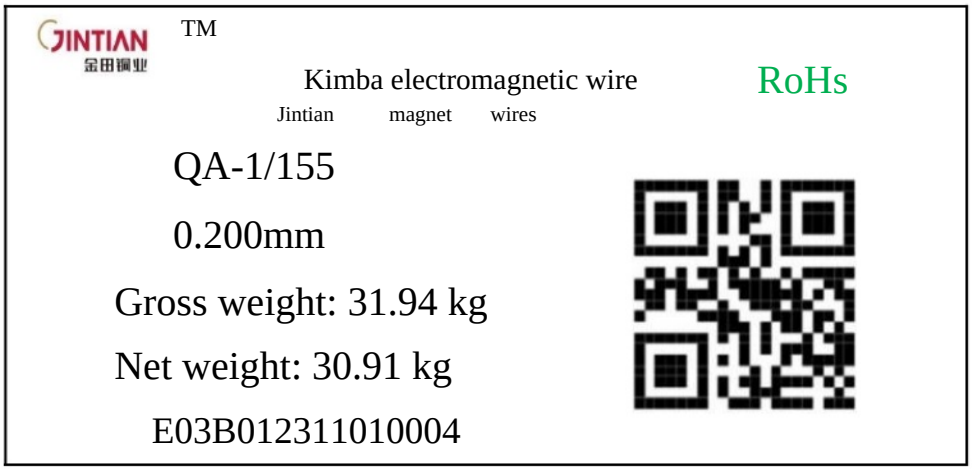


Table 1: **Technical Requirements and Indicators for Enamelled Wire**

Customer Name	General customers	**Implementation date**	August 25th, 2023
File types	Specification sheet	**Page**	**Page** 7 of 15
Product Name	155-class polyurethane enameled copper round wire	**Repair Order**	Version 1, Release 0

Continued Table 1:

Nominal diameter / mm	Conductor tolerance / mm		Minimum paint film thickness / mm			Maximum outer diameter / mm		
	Upper tolerance	Lower tolerance	Thin paint film	Thick paint film	Thickened paint film	Thin paint film	Thick paint film	Thickened paint film
0.41	-0.005	0.005	0.022	0.042	0.064	0.451	0.473	0.493
0.42	-0.005	0.005	0.022	0.042	0.064	0.461	0.483	0.503
0.43	-0.005	0.005	0.022	0.042	0.640	0.471	0.493	0.513
0.44	-0.005	0.005	0.022	0.042	0.640	0.481	0.503	0.523
0.45	-0.005	0.005	0.022	0.042	0.640	0.491	0.513	0.533
0.46	-0.005	0.005	0.024	0.045	0.067	0.504	0.526	0.547
0.47	-0.005	0.005	0.024	0.045	0.067	0.514	0.536	0.557
0.48	-0.005	0.005	0.024	0.045	0.067	0.524	0.546	0.567
0.49	-0.005	0.005	0.024	0.045	0.067	0.534	0.556	0.577
0.50	-0.005	0.005	0.024	0.045	0.067	0.544	0.566	0.587
0.51	-0.006	0.006	0.025	0.047	0.071	0.556	0.580	0.603
0.52	-0.006	0.006	0.025	0.047	0.071	0.566	0.590	0.613
0.53	-0.006	0.006	0.025	0.047	0.071	0.576	0.600	0.623
0.54	-0.006	0.006	0.025	0.047	0.071	0.586	0.610	0.633
0.55	-0.006	0.006	0.025	0.047	0.071	0.596	0.620	0.643
0.56	-0.006	0.006	0.025	0.047	0.071	0.606	0.630	0.653
0.57	-0.006	0.006	0.027	0.050	0.075	0.619	0.644	0.668
0.58	-0.006	0.006	0.027	0.050	0.075	0.629	0.654	0.678
0.59	-0.006	0.006	0.027	0.050	0.075	0.639	0.664	0.688
0.60	-0.006	0.006	0.027	0.050	0.075	0.649	0.674	0.698
0.61	-0.006	0.006	0.027	0.050	0.075	0.659	0.684	0.708
0.62	-0.006	0.006	0.027	0.050	0.075	0.669	0.694	0.718
0.63	-0.006	0.006	0.027	0.050	0.075	0.679	0.704	0.728
0.64	-0.007	0.007	0.028	0.053	0.080	0.692	0.719	0.744
0.65	-0.007	0.007	0.028	0.053	0.080	0.702	0.729	0.754
0.66	-0.007	0.007	0.028	0.053	0.080	0.712	0.739	0.764
0.67	-0.007	0.007	0.028	0.053	0.080	0.722	0.749	0.774
0.68	-0.007	0.007	0.028	0.053	0.080	0.732	0.759	0.784
0.69	-0.007	0.007	0.028	0.053	0.080	0.742	0.769	0.794
0.70	-0.007	0.007	0.028	0.053	0.080	0.752	0.779	0.804
0.71	-0.007	0.007	0.028	0.053	0.080	0.762	0.789	0.814
0.72	-0.008	0.008	0.030	0.056	0.085	0.775	0.804	0.831
0.73	-0.008	0.008	0.030	0.056	0.085	0.785	0.814	0.841
0.74	-0.008	0.008	0.030	0.056	0.085	0.795	0.824	0.851
0.75	-0.008	0.008	0.030	0.056	0.085	0.805	0.834	0.861

Customer Name	General customers	**Implementation date**	August 25th, 2023
File types	Specification sheet	**Page**	**Page** 8 of 15
Product Name	155-class polyurethane enameled copper round wire	**Repair Order**	Version 1, Release 0

Continued Table 1:

Nominal diameter / mm	Conductor tolerance / mm		Minimum paint film thickness / mm			Maximum outer diameter / mm		
	Upper tolerance	Lower tolerance	Thin paint film	Thick paint film	Thickened paint film	Thin paint film	Thick paint film	Thickened paint film
0.76	-0.008	0.008	0.030	0.056	0.085	0.815	0.844	0.871
0.77	-0.008	0.008	0.030	0.056	0.085	0.825	0.854	0.881
0.78	-0.008	0.008	0.030	0.056	0.085	0.835	0.864	0.891
0.79	-0.008	0.008	0.030	0.056	0.085	0.845	0.874	0.901
0.80	-0.008	0.008	0.030	0.056	0.085	0.855	0.884	0.911
0.81	-0.009	0.009	0.032	0.060	0.090	0.869	0.899	0.928
0.82	-0.009	0.009	0.032	0.060	0.090	0.879	0.909	0.938
0.83	-0.009	0.009	0.032	0.060	0.090	0.889	0.919	0.948
0.84	-0.009	0.009	0.032	0.060	0.090	0.899	0.929	0.958
0.85	-0.009	0.009	0.032	0.060	0.090	0.909	0.939	0.968
0.86	-0.009	0.009	0.032	0.060	0.090	0.919	0.949	0.978
0.87	-0.009	0.009	0.032	0.060	0.090	0.929	0.959	0.988
0.88	-0.009	0.009	0.032	0.060	0.090	0.939	0.969	0.998
0.89	-0.009	0.009	0.032	0.060	0.090	0.949	0.979	1.008
0.90	-0.009	0.009	0.032	0.060	0.090	0.959	0.989	1.018
0.91	-0.010	0.010	0.034	0.063	0.095	0.972	1.004	1.034
0.92	-0.010	0.010	0.034	0.063	0.095	0.982	1.014	1.044
0.93	-0.010	0.010	0.034	0.063	0.095	0.992	1.024	1.054
0.94	-0.010	0.010	0.034	0.063	0.095	1.002	1.034	1.064
0.95	-0.010	0.010	0.034	0.063	0.095	1.012	1.044	1.074
0.96	-0.010	0.010	0.034	0.063	0.095	1.022	1.054	1.054
0.97	-0.010	0.010	0.034	0.063	0.095	1.032	1.064	1.064
0.98	-0.010	0.010	0.034	0.063	0.095	1.042	1.074	1.074
0.99	-0.010	0.010	0.034	0.063	0.095	1.052	1.084	1.084
1.00	-0.010	0.010	0.034	0.063	0.095	1.062	1.094	1.094
1.05	-0.011	0.011	0.034	0.065	0.098	1.114	1.147	1.178
1.10	-0.011	0.011	0.034	0.065	0.098	1.164	1.197	1.197
1.15	-0.012	0.012	0.035	0.067	0.100	1.216	1.249	1.281
1.20	-0.013	0.013	0.035	0.067	0.100	1.268	1.302	1.335
1.25	-0.013	0.013	0.035	0.067	0.100	1.318	1.352	1.385
1.30	-0.013	0.013	0.036	0.069	0.103	1.368	1.402	1.435
1.35	-0.014	0.014	0.036	0.069	0.103	1.418	1.452	1.452
1.40	-0.014	0.014	0.036	0.069	0.103	1.468	1.502	1.502
1.45	-0.015	0.015	0.038	0.071	0.107	1.520	1.556	1.590
1.50	-0.015	0.015	0.038	0.071	0.107	1.570	1.606	1.640
1.55	-0.016	0.016	0.038	0.071	0.107	1.620	1.656	1.656
1.60	-0.016	0.016	0.038	0.071	0.107	1.670	1.706	1.706

广东金田铜业有限公司
产 品 执 行 标 准

客户名称	通用客户	实施日期	2023/8/25
文件种类	规格书	页　　次	第 9 页，共15页
产品名称	155级聚氨酯漆包铜圆线	修　　订	第 1 版 第 0 次

表2:

标称直径 mm	最小电阻值 Ω/m	最大电阻值 Ω/m	标称直径 mm	最小电阻值 Ω/m	最大电阻值 Ω/m	标称直径 mm	最小电阻值 Ω/m	最大电阻值 Ω/m
0.05	7.051	10.74	0.41	0.1253	0.1338	0.77	0.03565	0.03781
0.06	5.045	7.235	0.42	0.1195	0.1275	0.78	0.03475	0.03683
0.07	4.05	4.89	0.43	0.114	0.1215	0.79	0.03389	0.0359
0.08	3.133	3.703	0.44	0.109	0.116	0.80	0.03305	0.035
0.09	2.495	2.9	0.45	0.1042	0.1109	0.81	0.03217	0.03422
0.10	2.034	2.333	0.46	0.09981	0.106	0.82	0.0314	0.03338
0.11	1.69	1.917	0.47	0.09565	0.1015	0.83	0.03066	0.03257
0.12	1.426	1.604	0.48	0.09174	0.0973	0.84	0.02994	0.03179
0.13	1.22	1.361	0.49	0.08807	0.09333	0.85	0.02925	0.03104
0.14	1.055	1.17	0.50	0.08462	0.08959	0.86	0.02858	0.03031
0.15	0.9219	1.016	0.51	0.08105	0.08642	0.87	0.02793	0.02961
0.16	0.8122	0.8906	0.52	0.078	0.08309	0.88	0.02731	0.02894
0.17	0.7211	0.7871	0.53	0.07512	0.07995	0.89	0.0267	0.02828
0.18	0.6444	0.7007	0.54	0.07239	0.07698	0.90	0.02612	0.02765
0.19	0.5794	0.6278	0.55	0.06981	0.07418	0.91	0.0255	0.02710
0.20	0.5237	0.5657	0.56	0.06736	0.07153	0.92	0.02495	0.02651
0.21	0.4757	0.5123	0.57	0.06504	0.06901	0.93	0.02442	0.02594
0.22	0.434	0.4662	0.58	0.06284	0.06663	0.94	0.02391	0.02538
0.23	0.3941	0.4298	0.59	0.06075	0.06437	0.95	0.02342	0.02484
0.24	0.3625	0.3941	0.60	0.05876	0.06222	0.96	0.02294	0.02432
0.25	0.3345	0.3628	0.61	0.05687	0.06017	0.97	0.02247	0.02382
0.26	0.3096	0.335	0.62	0.05507	0.05823	0.98	0.02202	0.02333
0.27	0.2874	0.3103	0.63	0.05335	0.05638	0.99	0.02158	0.02286
0.28	0.2676	0.2882	0.64	0.05155	0.05479	1.00	0.02116	0.02240
0.29	0.2497	0.2684	0.65	0.05000	0.0531	1.05	0.01917	0.02034
0.30	0.2335	0.2506	0.66	0.04851	0.05148	1.10	0.01748	0.01851
0.31	0.2189	0.2344	0.67	0.04708	0.04994	1.15	0.01598	0.01695
0.32	0.2056	0.2198	0.68	0.04572	0.04847	1.20	0.01467	0.01558
0.33	0.1934	0.2066	0.69	0.04442	0.04706	1.25	0.01353	0.01435
0.34	0.1813	0.1956	0.70	0.04317	0.04571	1.30	0.01252	0.01325
0.35	0.1712	0.1844	0.71	0.04198	0.04442	1.35	0.01160	0.01230
0.36	0.162	0.1742	0.72	0.04072	0.0433	1.40	0.01079	0.01143
0.37	0.1535	0.1648	0.73	0.03962	0.04211	1.45	0.01006	0.01066
0.38	0.1456	0.1561	0.74	0.03857	0.04097	1.50	0.00940	0.009955
0.39	0.1383	0.1481	0.75	0.03756	0.03987	1.55	0.0088	0.009329
0.40	0.1316	0.1407	0.76	0.03659	0.03882	1.60	0.00826	0.008749

Table 3: **Technical Requirements and Indicators for Enamelled Wire**

αt: 20℃ The general value of copper is 0.00396/K

Table 4:

Table 5: Technical Requirements Index of Enamelled Wire

Table 6:

Guangdong Jintian Copper Industry Co., Ltd.
Product implementation standard

Customer Name	General customers	**Implementation date**	August 25th, 2023
File types	Specification sheet	**Page "next"**	Page 12, of 15 pages
Product Name	155-class polyurethane enameled copper round wire	**Repair Order**	Version 1, Release 0

Table 8:

Table 9: **Technical Requirements and Indicators for Enamelled Wire**

Table 10:

Diameter lower limit (mm)	Upper limit of diameter (mm)	Boost rate (V/S)	Maximum leakage current (mA)
-	500	20	5
501	2500	100	5
2501	-	500	5

Table 11: **Technical Requirements and Indicators for Enamelled Wire**

Table 12:

Table 13:

Diameter lower limit (mm)	Diameter upper limit (mm)	Test conditions - Diameter of round bar (mm)	Test conditions - Load (N)	Resilience upper limit (°)		
				Thin paint film	Thick paint film	Thickened paint film
0.080	0.080	5	0.25	70	80	100
0.081	0.090			67	77	94
0.091	0.100			64	73	90
0.101	0.112	7	0.5	64	73	88
0.113	0.125			62	70	84
0.126	0.140			59	67	79
0.141	0.160	10	1	59	67	78
0.161	0.180			57	65	75
0.181	0.200			54	62	72
0.201	0.224	12.5	2	51	59	68
0.225	0.250			49	56	65
0.251	0.280			47	53	61
0.281	0.315	19	4	50	55	62
0.316	0.355			48	53	59
0.356	0.400			45	50	55
0.401	0.450			44	48	53
0.451	0.500	25	8	43	47	51
0.501	0.560			41	44	48
0.561	0.630			46	50	53
0.631	0.710	37.5	12	44	47	50
0.711	0.800			41	43	46
0.801	0.900	50	15	45	48	51
0.901	1.000			42	45	47
1.001	1.120			39	41	43
1.121	1.250			35	37	39
1.251	1.400			35	34	36
1.401	1.600			28	30	32
1.601	2.500	-	-	5		