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SPECIFICATION APPROVAL SHEET

Polyurethane Enamelled Copper Wire

UEF1/U(155°C) Grade 1

Size Range : (0.04-1.60)

NOTE : Approval content

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Test Report

Tianjin Ruiyuan Electric Material Co.,Ltd.

(Stamp)

| APPROVED | CHECKED | PREPARED |
|----------|---------|----------|
| | | |

1. Materials name:

- 1.1. Conductor materials : The conductor shall be the enameled copper wire specified in IEC 60317.
- 1.2. Insulation covering : The insulating film of the wire shall be made by baking insulating varnish mainly composed of high thermal polyurethane on the conductor uniformly and perfectly.
- 1.3 Thermal class: MW-79C class 155°C ; Above with 1.2mm specification to belong IEC60317-20.
- 1.4 Environment request : Conforms to “ROHS” and “does not have the halogen” the request.

2. Examination item and characteristic :

| Item | Characteristic |
|------------------------------|---|
| Appearance | (1)Surface no injuries and adhesion (2)Smooth surface and color uniform (3)Insulation film is not nail scrape |
| Dimension | The size shall be as given in table |
| Pinhole | DC 12V 1min,Maximum 8 take a test piece of about 5M |
| Flexibility | Elongation method, no crack on the film |
| Adherence | No crack on the film |
| Resistance to abrasion | The size shall be as given in table 1 |
| Continuity of insulation | The number of faults per 30m of wire shall not exceed the values give in table and test voltages. |
| Dielectric breakdown voltage | Shall meet the values specified in attached table 1 |
| Resistance to cut though | No failure shall occur within 2min at 200°C |
| Resistance to heat shock | (1) Film shall show no crack though which conductor is visible; (2) The specimen shall be heat to 175±5°C , 1/2hr ; (3) More than 1.2mm specification heating temperature of 175±5°C , 1hr. |
| Resistance to solvent | Nail method or Pencil method,the film peels no expose the conductor. |
| Solderability | Solder shall adhere to the conductor uniformly |
| Conductor resistance | Shall meet the values specified in attached table 1 |
| Elongation | Shall meet the values specified in attached table 1 |
| Springiness | Shall meet the values specified in attached table 1 |

3. Test methods:

- 3.1 Appearance: Shall then be examined with eyes.
- 3.2 Dimension: Comply with No. test 4 of IEC 60851-2
- 3.3 Pinhole : Comply with NO. 7 of IEC60851-5.
- 3.4 Flexibility: Comply with No. test 8 of IEC 60851-3
- 3.5 Adherence: Comply with No. test 8 of IEC 60851-3
- 3.6 Resistance to abrasion: Comply with No. test 11 of IEC 60851-3.
- 3.7 Continuity of insulation : Comply with No. test 14 of IEC 60851-5

| Nominal conductor diameter(mm) | | Voltage(d.c)V |
|--------------------------------|-------|---------------|
| > | ≤ | |
| 0.05 | 0.125 | 350 |
| 0.125 | 0.25 | 500 |
| 0.25 | 0.50 | 750 |
| 0.50 | 1.60 | 1000 |

| Nominal conductor diameter(mm) | | Maximam number of faults per 30m |
|--------------------------------|-------|----------------------------------|
| > | ≤ | |
| - | 0.05 | 40 |
| 0.05 | 0.08 | 40 |
| 0.08 | 0.125 | 30 |
| 0.125 | 1.60 | 10 |

3.8 Dielectric breakdown voltage: Comply with No. test 13 of IEC 60851-5.next table of hook no and twist number.

| Conductor diameter(mm) | | Hook no(g) | Length 12cm of twist number |
|------------------------|-------|------------|-----------------------------|
| > | ≤ | | |
| - | 0.04 | 6 | -- |
| 0.04 | 0.045 | 8 | -- |
| 0.045 | 0.05 | 10 | -- |
| 0.05 | 0.056 | 12 | -- |
| 0.056 | 0.063 | 15 | -- |
| 0.063 | 0.071 | 20 | -- |
| 0.071 | 0.08 | 25 | -- |
| 0.08 | 0.09 | 30 | -- |
| 0.09 | 0.10 | 40 | -- |
| 0.10 | 0.25 | 85 | 33 |
| 0.25 | 0.355 | 170 | 23 |
| 0.355 | 0.50 | 340 | 16 |
| 0.50 | 0.710 | 700 | 12 |
| 0.710 | 1.06 | 1350 | 8 |
| 1.06 | 1.40 | 2700 | 6 |
| 1.40 | 2.00 | 5400 | 4 |

3.9.Resistance to Cut through test : Comply with NO.3.50 of MW 1000 test. So next table of exert weight:

| Conductor diameter(mm) | Exert weigh(g) |
|------------------------|----------------|
| 0.04~0.071 | 100 |
| 0.079~0.114 | 150 |
| 0.127~0.254 | 250 |
| 0.287~0.361 | 300 |
| 0.404~0.455 | 600 |
| 0.511~0.912 | 1000 |
| 1.024~1.628 | 2000 |

3.10 Resistance to heat shock test: Comply with No. 3.5 of MW 1000 test; More than 1.2mm specification Comply with IEC60317-20:

| Conductor diameter(mm) | Elongation or diameter of winding mandrel | Conductor diameter(mm) | Elongation or diameter of winding mandrel |
|------------------------|---|------------------------|---|
| 0.051~0.226 | 20%↑ 3d | 1.20~1.60 | 3d |
| 0.254~1.151 | 20% 3d | | |

3.11.Resistance to solvent test : Comply with No. test 12 of IEC 60851-4.

3.12.Solderability : Comply with JISC3216-4. So next table of dipping time:

| Conductor diameter (mm) | Dipping time (second) |
|---------------------------|-------------------------|
| 0.32↓ | 380°C/2S |
| 0.35~0.50 | 380°C/3S |
| 0.55~1.00 | 380°C/4S |
| 1.10~1.50 | 380°C/5S |
| 1.60 | 380°C/6S |

3.13.Conductor resistance test: Comply with No. test 5 of IEC 60851-5.

3.14.Elongation: Comply with No. test 6 of IEC 60851-3. The size shall be as given in table 1.

Elongation (%) =[(length between gauge lines with parts in contact) -(gauge length)]/(gauge length)×100

3.15.Springiness:Comply with No. test 7 of IEC 60851-3

4. Packing of axle specification: So next table

| Conductor diameter (φmm) | Gluey of axle | | Min. weight (kg) |
|-----------------------------|---------------|-------|---------------------|
| | JIS | PEWSC | |
| 0.04~0.09 | PT-4 | ER-5L | 0.5 |
| 0.10~0.15 | PT-4 | ER-5L | 1.0 |
| 0.16~0.29 | PT-10 | ER-6L | 3.5 |
| 0.30~0.69 | PT-15 | ER-7L | 5.0 |
| 0.70~1.60 | PT-25 | ER-9L | 9.0 |

5. Packing:

Mark in the reel

- 5.1 Wire name and kind
- 5.2 Conductor diameter
- 5.3 Operating number
- 5.4 Manufacturing date
- 5.5 Net weight of one reel of winding

6.Storage conditions and shelf life.

- 6.1 There are no specific requirements in any of International Standards (JIS3202、 3003、 NEMA1000).
- 6.2 Recommend to store in room temperature, dry and ventilated environment.
- 6.3 If the product is stored more than 3 years, tests should be performed in accordance with International Standards to check its validity before use.

Attached table 1

| Diameter (φmm) | Tolerance (mm) | Min. Increase in diameter (mm) | Max. Overall Diameter (mm) | Min. Dielectric breakdown voltage (v) | Max. Conductor resistance 20°C (Ω/KM) | Min. Elongation (%) | Max Springiness | Resistance to Abrasion(g) | |
|-------------------|-------------------|---|-------------------------------------|---|---|---------------------------|--------------------|------------------------------|---------|
| | | | | | | | | Average | Minimum |
| 0.040 | ±0.002 | 0.004 | 0.049 | 250 | 15202 | 9 | -- | -- | -- |
| 0.045 | ±0.003 | 0.005 | 0.055 | 275 | 12445 | 9 | -- | -- | -- |
| 0.050 | ±0.003 | 0.005 | 0.060 | 300 | 9938 | 10 | -- | -- | -- |
| 0.056 | ±0.003 | 0.006 | 0.067 | 325 | 7815 | 10 | -- | -- | -- |
| 0.063 | ±0.003 | 0.007 | 0.076 | 375 | 6098 | 12 | -- | -- | -- |
| 0.071 | ±0.003 | 0.007 | 0.084 | 425 | 4747 | 13 | -- | -- | -- |
| 0.080 | ±0.003 | 0.007 | 0.094 | 425 | 3703 | 14 | 70 | -- | -- |
| 0.090 | ±0.003 | 0.008 | 0.105 | 500 | 2900 | 15 | 67 | -- | -- |
| 0.100 | ±0.003 | 0.008 | 0.117 | 500 | 2333 | 16 | 64 | -- | -- |
| 0.112 | ±0.003 | 0.009 | 0.130 | 1300 | 1848 | 17 | 64 | -- | -- |
| 0.125 | ±0.003 | 0.010 | 0.144 | 1500 | 1475 | 17 | 62 | -- | -- |
| 0.140 | ±0.003 | 0.011 | 0.160 | 1600 | 1170 | 18 | 59 | -- | -- |
| 0.160 | ±0.003 | 0.012 | 0.182 | 1700 | 890.6 | 19 | 59 | -- | -- |
| 0.180 | ±0.003 | 0.013 | 0.204 | 1700 | 700.7 | 20 | 57 | -- | -- |
| 0.200 | ±0.003 | 0.014 | 0.226 | 1800 | 565.7 | 21 | 54 | -- | -- |
| 0.224 | ±0.003 | 0.015 | 0.252 | 1900 | 449.5 | 21 | 51 | -- | -- |
| 0.250 | ±0.004 | 0.017 | 0.281 | 2100 | 362.8 | 22 | 49 | 230 | 195 |
| 0.280 | ±0.004 | 0.018 | 0.312 | 2200 | 288.2 | 22 | 47 | 250 | 210 |

Attached table 1

| Diameter (ϕ mm) | Tolerance (mm) | Min. Increase in diameter (mm) | Max. Overall Diameter Grade 2 (mm) | Min. Dielectric breakdown voltage (v) | Max. Conductor resistance 20°C (Ω /KM) | Min. Elongation (%) | Max Springiness | Resistance to Abrasion(g) | |
|--------------------------|-------------------|---|--|---|--|---------------------------|--------------------|------------------------------|---------|
| | | | | | | | | Average | Minimum |
| 0.315 | ± 0.004 | 0.019 | 0.349 | 2200 | 227 | 23 | 50 | 270 | 230 |
| 0.355 | ± 0.004 | 0.020 | 0.392 | 2300 | 178.2 | 23 | 48 | 290 | 250 |
| 0.400 | ± 0.005 | 0.021 | 0.439 | 2300 | 140.7 | 24 | 45 | 315 | 270 |
| 0.450 | ± 0.005 | 0.022 | 0.491 | 2300 | 110.9 | 25 | 44 | 340 | 290 |
| 0.500 | ± 0.005 | 0.024 | 0.544 | 2400 | 89.59 | 25 | 43 | 365 | 310 |
| 0.560 | ± 0.006 | 0.025 | 0.606 | 2500 | 71.53 | 26 | 41 | 390 | 330 |
| 0.630 | ± 0.006 | 0.027 | 0.679 | 2600 | 56.38 | 27 | 46 | 420 | 355 |
| 0.710 | ± 0.007 | 0.028 | 0.762 | 2600 | 44.42 | 28 | 44 | 450 | 380 |
| 0.800 | ± 0.008 | 0.030 | 0.855 | 2600 | 35 | 28 | 41 | 480 | 410 |
| 0.900 | ± 0.009 | 0.032 | 0.959 | 2700 | 27.65 | 29 | 45 | -- | -- |
| 1.000 | ± 0.010 | 0.034 | 1.062 | 2700 | 22.4 | 30 | 42 | -- | -- |
| 1.120 | ± 0.011 | 0.034 | 1.184 | 2700 | 17.85 | 30 | 39 | -- | -- |
| 1.250 | ± 0.013 | 0.035 | 1.316 | 2700 | 14.35 | 31 | 35 | -- | -- |
| 1.400 | ± 0.014 | 0.036 | 1.468 | 2700 | 11.43 | 32 | 32 | -- | -- |
| 1.600 | ± 0.016 | 0.038 | 1.670 | 2700 | 8.75 | 22 | 28 | -- | -- |

Note: This product specification acknowledgement will come into effect one month after it is delivered to your company with or without your acknowledgement.