LS Magnet Wire
Higher Performance with Greater Reliability
LG Cable, LG Industrial Systems and LG-Nikko Copper, Gaon Cable, E1 and Kukdong City Gas are starting with a new name, Leading Solution, LS.
New Dream, New Start

To become a leader in the competitive global market, LG has been divided into three groups, electronics and chemicals for LG, energy and distribution for GS, Industrial electric electronics and material for LS based on their business specialties.

LS’ main companies, such as LS cable, LS industrial systems, LS-Nikko copper, Gaon cable, E1 and Kukdong City gas, are ranked as No.1 in their respective industry. However, LS won’t just sit back, satisfied with being the best in Korea. We will pave the way for becoming the world’s best in Industrial electric electronics and material industry with the new CI, LS.

Your good partner LG Cable is making a fresh start as LS Cable

LS Cable is No. 1 cable maker in Korea and its business fields are telecommunication, electric power, components & materials and machinery. Also, LS Cable is creating new businesses particularly in component and materials industry. LS Cable makes its best to accomplish the vision, ‘Your No.1 Creative Partner’ and be one of the world leaders with high technology and best level of service.
At the heart of the energy conversion system between electrical, electromagnetic, mechanical and other forms of energy, which system corresponds to the nerves and blood vessels of the electrical equipment and their properties, our products show high performance with great reliability. Our ceaseless effort to research, design, develop, and manufacture the products has been keeping our position as a leading company in customer satisfaction level in the industry.

The quality control meets the most delicate requirements of international standards and the high level of quality is recognized both by domestic and international customers. Our commitment to develop and deliver solutions to address our customers’ needs and challenges keep our technology on the cutting edge and our know-how in the field more valuable, which our clients highly appreciate.
## Contents

**Introduction** ................................................................................................................................. 4

1. Production Process of Magnet Wires .......................................................................................... 6

2. **Type of Enameled Wires** ........................................................................................................... 7
   2-1. Single-Coated (Monolithic) Enameled Wires ........................................................................ 9
   2-2. Double-Coated Enameled Wires .......................................................................................... 11
   2-3. Litz Wires ............................................................................................................................ 18

3. **Dimension of Enameled Wires** ............................................................................................... 19
   3-1. NEMA Standard ................................................................................................................... 20
   3-2. BS (British Standard) .......................................................................................................... 21
   3-3. KS : CLASS 0 (Zero) Enameled Wires .............................................................................. 22
   3-4. KS : CLASS 1 Enameled Wires .......................................................................................... 23
   3-5. KS : CLASS 2 Enameled Wires .......................................................................................... 24
   3-6. SBH-EIW ............................................................................................................................ 25
   3-7. GADW (GADWC) .............................................................................................................. 26
   3-8. Litz Wires ............................................................................................................................ 27

4. **Engineering Data** .................................................................................................................... 28
   4-1. Solvent Resistance of Enameled Wires ............................................................................... 29
   4-2. Properties of Various Enameled Wires after being Elongated ............................................ 30
   4-3. Critical Properties of Various Enameled Wires .................................................................. 31
   4-4. Refrigerant Resistance of Various Enameled Wires ............................................................ 32
   4-5. Crazing and Cure Effect of Various Enameled Wires ......................................................... 32
   4-6. Tension Table for Coiling ................................................................................................... 33

5. **Bobbin for Enameled Wires** .................................................................................................... 34
   5-1. Bobbin Dimensions ............................................................................................................. 35
   5-2. Bobbin Patterns for Enameled Wires .................................................................................... 36

6. **Notes and Warnings** .............................................................................................................. 37

   Quality Certificates ...................................................................................................................... 38
   Products & Systems of LS Cable .................................................................................................. 40
   Global Network ............................................................................................................................ 42
## 1. Production Process of Magnet Wires

<table>
<thead>
<tr>
<th>Material Process</th>
<th>SCR Wire Rod</th>
<th>Varnish</th>
<th>Dies / Felt</th>
<th>Bobbin</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incoming Material</td>
<td>Electric Copper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incoming Inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Process Inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td>Drawing</td>
<td></td>
<td>Coating</td>
<td></td>
</tr>
<tr>
<td>Normal Inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TYPE OF ENAMELED WIRES
## 2. Type of Enamelled Wires

<table>
<thead>
<tr>
<th>Type</th>
<th>Code (Commercial Name)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single-Coated Enamelled Wires</strong></td>
<td></td>
</tr>
<tr>
<td>PEW</td>
<td>Polyester Enamelled Wire (UL)</td>
</tr>
<tr>
<td>UEW</td>
<td>Polyurethane Enamelled Wire (UL)</td>
</tr>
<tr>
<td>UEW-N</td>
<td>No-Crazing Polyurethane Enamelled Wire</td>
</tr>
<tr>
<td>EIW</td>
<td>Polyesterimide Enamelled Wire (UL)</td>
</tr>
<tr>
<td>EIW-F</td>
<td>Polyesterimide Enamelled Wire (UL)</td>
</tr>
<tr>
<td>AW</td>
<td>Polyamideimide Enamelled Wire (UL)</td>
</tr>
<tr>
<td>PVF</td>
<td>Polyvinylformal Enamelled Wire</td>
</tr>
<tr>
<td>SEW</td>
<td>Solderable Polyesterimide</td>
</tr>
<tr>
<td><strong>Double-Coated Enamelled Wires</strong></td>
<td></td>
</tr>
<tr>
<td>SBH-EIW</td>
<td>Polyesterimide Overcoated With Self-bonding Enamelled Wire (UL, Bondable by Heating)</td>
</tr>
<tr>
<td>SBL-EIW</td>
<td>Polyesterimide Overcoated With Self-bonding Enamelled Wire (Bondable by Alcohol)</td>
</tr>
<tr>
<td>AMSW</td>
<td>Polyesterimide Overcoated With Polyamideimide Self-bonding Enamelled Wire</td>
</tr>
<tr>
<td>SMUW</td>
<td>(Bondable by Heating, High Resoftening Temperature Type)</td>
</tr>
<tr>
<td>SB-SEW</td>
<td>Urethane Overcoated With Self-bonding Enamelled Wire</td>
</tr>
<tr>
<td>RRW-H</td>
<td>Solderable Polyesterimide Overcoated With Self-bonding Enamelled Wire</td>
</tr>
<tr>
<td>SURW, SLAW</td>
<td>Self-Lubricated Refrigerant Resistance Enamelled Wire</td>
</tr>
<tr>
<td>NY-UEW</td>
<td>Nylon overcoated Polyurethane Enamelled Wire (UL)</td>
</tr>
<tr>
<td>NY-EW(F)</td>
<td>Nylon overcoated Polyesterimide Enamelled Wire (UL)</td>
</tr>
<tr>
<td>NY-PWE</td>
<td>Nylon overcoated Polyester Enamelled Wire</td>
</tr>
<tr>
<td>GADW</td>
<td>Double-Coated Aluminium Enamelled Wire (Aluminium Conductor, 200°C)</td>
</tr>
<tr>
<td>GADWC</td>
<td>Double-Coated Aluminium Enamelled Wire (Aluminium Conductor, 220°C)</td>
</tr>
<tr>
<td>AHEIW</td>
<td>Polyamideimide Overcoated Polyesterimide Enamelled Wire (UL, Thermal Index: 200°C)</td>
</tr>
<tr>
<td>MRW</td>
<td>Polyamideimide Overcoated Polyesterimide Enamelled Wire (UL, Thermal Index: 220°C)</td>
</tr>
<tr>
<td>EXLW-C</td>
<td>Polyamideimide Enamelled Wire</td>
</tr>
<tr>
<td>EXLWN</td>
<td>Polyamideimide Overcoated Polyesterimide Enamelled Wire</td>
</tr>
<tr>
<td>EXLWP</td>
<td>Polyamideimide Overcoated Polyesterimide Enamelled Wire (UL, Thermal Index: 200°C)</td>
</tr>
<tr>
<td><strong>Litz Wires</strong></td>
<td></td>
</tr>
<tr>
<td>LZSW</td>
<td>H Class Litz Wire</td>
</tr>
<tr>
<td>SLZSW</td>
<td>Solderable Litz Wire</td>
</tr>
</tbody>
</table>
## 2. Type of Enameled Wires

### 2・1. Single-Coated (Monolithic) Enameled wires

<table>
<thead>
<tr>
<th>Type</th>
<th>Features</th>
<th>Applications</th>
<th>Specification</th>
<th>Thermal Index</th>
<th>UL File Number</th>
<th>Product Range</th>
</tr>
</thead>
</table>
| **P EW** Polyester Enameled Wire | - Good electrical characteristics  
- High continuous operating temperature  
- Possible to be colored | - Motors (General purpose)  
- Motors for home appliance  
- Magnet coils | KSC 3107, JISC 3202  
B(130°C), F(155°C) | -  | E84441 | 0.08 ~ 2.5 mm |
| **U EW** Polyurethane Enameled Wire | - Good solderability  
- Superior characteristics at high frequency  
- Free to coloring | - Communication apparatus  
- Small motors  
- Electric devices  
- Relays | KSC 3107, JISC 3202  
A(105°C), E(120°C), B(130°C), F(155°C) | -  | E84441 | 0.05 ~ 1.5 mm |
| **U EW-N** No-Crazing Polyurethane Enameled Wire | - Excellent crazing resistance | - F.B.T. | LSC  
E(120°C), B(130°C) | -  | - | 0.08 ~ 0.5 mm |
| **E IW** Polyesterimide Enameled Wire | - Excellent heat resistance  
- Excellent heat-shock resistance | - Motors | KSC 3107, JISC 3202, NEMA MW30, JCS 333  
H(180°C) | -  | E84441 | 0.08 ~ 2.5 mm |
2. Type of Enameled Wires

2.1. Single-Coated (Monolithic) Enameled wires

**EIW(F)**
Polyesterimide Enameled Wire

- **Features**
  - Excellent heat resistance
  - Excellent heat-shock resistance

- **Applications**
  - Motors

**Specifications**
- **Specification**: NEMA MW5
- **Thermal index**: F (155°C)
- **UL file number**: E84441
- **Product range**: 0.05 ~ 3.2 mm

**AIW**
Polyamideimide Enameled Wire

- **Features**
  - Excellent abrasion resistance
  - Excellent thermal stability
  - Good resistance to overload and cut-through

- **Applications**
  - Apparatus for high operating temperature
  - Motors for power tools
  - Motors used in Freon gas
  - Electric Components for automobile

**Specifications**
- **Specification**: JCS 334A
- **Thermal index**: C (220°C)
- **UL file number**: E84441
- **Product range**: 0.10 ~ 1.5 mm

**PVF**
Polyvinylformal Enameled Wire

- **Features**
  - Good abrasion resistance
  - Excellent hydrolysis resistance
  - Excellent solvent resistance

- **Applications**
  - General use
  - Hermetic purpose
  - Oil immersed transformer

**Specifications**
- **Specification**: KSC 3107, JISC 3202
- **Thermal index**: A (105°C)
- **UL file number**:
- **Product range**: 0.05 ~ 3.2 mm

**SEW**
Solderable Polyesterimide Enameled Wire

- **Features**
  - Solderable without stripping off

- **Applications**
  - Apparatus for high operating temperature

**Specifications**
- **Specification**: LSC
- **Thermal index**: F (155°C)
- **UL file number**:
- **Product range**: 0.10 ~ 0.35 mm
2. Type of Enameled Wires

2.2 Double-Coated Enameled Wires

2.2.1. Self-Bonding Enameled Wires

**SBH-EIW**
Polyesterimide Overcoated With Self-Bonding Enameled Wire

- **Features**
  - Bondable by heating without impregnating
  - Excellent thermal stability

- **Applications**
  - Deflection yoke coils
  - Magnet coils (Clutch coil, Vacuum Cleaner Motor, etc)

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>H(180°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td>E84441</td>
</tr>
<tr>
<td>Product range</td>
<td>0.12 ~ 0.90 mm</td>
</tr>
</tbody>
</table>

**SBL-EIW**
Polyesterimide Overcoated With Self-Bonding Enameled Wire

- **Features**
  - Bondable by alcohol without impregnating
  - Excellent thermal stability

- **Applications**
  - Magnet coils (Clutch coil, Vacuum Cleaner Motor, etc)

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>H(180°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td>E84441</td>
</tr>
<tr>
<td>Product range</td>
<td>0.12 ~ 0.90 mm</td>
</tr>
</tbody>
</table>

**AMSW**
Polyesterimide Overcoated With Polyamideimide Self-Bonding Enameled Wire

- **Features**
  - Bondable by heating without impregnating
  - High resofting temperature type: 190 - 200°C
  - Excellent thermal stability

- **Applications**
  - Motors for automobile

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>N(200°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td>E84441</td>
</tr>
<tr>
<td>Product range</td>
<td>0.50 ~ 1.50 mm</td>
</tr>
</tbody>
</table>

**SMUW**
Urethane Overcoated With Self-Bonding Enameled Wire

- **Features**
  - Bondable by heating without impregnating
  - Solderable without stripping off

- **Applications**
  - Deflection yoke coils
  - Magnet coils

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>F(155°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td></td>
</tr>
<tr>
<td>Product range</td>
<td>0.12 ~ 0.35 mm</td>
</tr>
</tbody>
</table>

**SB-SEW**
Solderable Polyesterimide Overcoated With Self-Bonding Enameled Wire

- **Features**
  - Bondable by heating without impregnating
  - Solderable without stripping off

- **Applications**
  - Deflection yoke coils
  - Magnet coils

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>F(155°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td></td>
</tr>
<tr>
<td>Product range</td>
<td>0.12 ~ 0.35 mm</td>
</tr>
</tbody>
</table>
2. Double-Coated Enameled wires

2.1. Refrigerant Resistance Enameled Wire

**RRW-H**
Refrigerant Resistance Enameled Wire

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC, NEMA MW73-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>N(200°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td>E84441</td>
</tr>
<tr>
<td>Product range</td>
<td>0.29 ~ 1.5 mm</td>
</tr>
</tbody>
</table>

**Features**
- Excellent refrigerant resistance

**Applications**
- Compressors for refrigerators & air-conditioners

---

**SLRW, SLAW**
Self-Lubricated Refrigerant Resistance Enameled Wire

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC, NEMA MW73-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>N(200°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td>E84441</td>
</tr>
<tr>
<td>Product range</td>
<td>0.29 ~ 1.5 mm</td>
</tr>
</tbody>
</table>

**Features**
- Good resistance to R-134a refrigerant
- No need lubricant

**Applications**
- Compressors for refrigerators & air-conditioner
### 2. Type of Enameled Wires

#### 2.2. Double-Coated Enameled wires

#### 2.2.3. Nylon Over-Coated Enameled Wires

**NY-UEW**  
Nylon overcoated Polyurethane Enameled Wire  
- **Features**: Suitable for high speed winding  
- **Applications**: Communication apparatus, Small motors, Electric devices, Relays  

<table>
<thead>
<tr>
<th>Specification</th>
<th>NEMA MW 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>B(130°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td>E84441</td>
</tr>
<tr>
<td>Product range</td>
<td>0.3 ~ 1.5 mm</td>
</tr>
</tbody>
</table>

**NY-EIW(F)**  
Nylon overcoated Polyester-imide Enameled Wire  
- **Features**: Suitable for high speed winding  
- **Applications**: Motors  

<table>
<thead>
<tr>
<th>Specification</th>
<th>NEMA MW 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>F(155°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td>E84441</td>
</tr>
<tr>
<td>Product range</td>
<td>0.3 ~ 1.5 mm</td>
</tr>
</tbody>
</table>

**NY-PEW**  
Nylon overcoated Polyester Enameled Wire  
- **Features**: Suitable for high speed winding  
- **Applications**: Motors (General purpose), Motors for home appliance, Magnet coils  

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC, F(NEMA 24C), H(NEMA 76C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>F(155°C), H(180°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td>E84441</td>
</tr>
<tr>
<td>Product range</td>
<td>0.3 ~ 1.2 mm</td>
</tr>
</tbody>
</table>
2. Type of Enameled Wires

2.2. Double-Coated Enameled wires

2.2.4. Aluminium Enameled Wires

**GADW**
Double-Coated Aluminium Enameled Wire

<table>
<thead>
<tr>
<th>Features</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter than copper products</td>
<td>High voltage transformers for microwave oven</td>
</tr>
<tr>
<td>Good electrical characteristics</td>
<td></td>
</tr>
<tr>
<td>Good heat-shock resistance</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC, NEMA MW35-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>N(200°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td>E84441</td>
</tr>
<tr>
<td>Product range</td>
<td>0.34 ~ 2.3 mm</td>
</tr>
</tbody>
</table>

**GADWC**
Double-Coated Aluminium Enameled Wire

<table>
<thead>
<tr>
<th>Features</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighter than copper products</td>
<td>High voltage transformers for microwave oven</td>
</tr>
<tr>
<td>Good electrical characteristics</td>
<td></td>
</tr>
<tr>
<td>Good heat-shock resistance</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC, NEMA MW35-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>C(220°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td>E84441</td>
</tr>
<tr>
<td>Product range</td>
<td>0.34 ~ 2.3 mm</td>
</tr>
</tbody>
</table>
2. Type of Enameled Wires

2.2. Double-Coated Enameled wires

2.2.5. AI-EIW / MRW

<table>
<thead>
<tr>
<th>Name</th>
<th>Features</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AI-EIW</strong></td>
<td>• High resistance to overload and cut-through</td>
<td>• High voltage transformers for micro-wave oven</td>
</tr>
<tr>
<td></td>
<td>• Good heat-shock resistance</td>
<td>• Electric components for automobile</td>
</tr>
<tr>
<td><strong>MRW</strong></td>
<td>• High resistance to overload and cut-through</td>
<td>• High voltage transformers for micro-wave oven</td>
</tr>
<tr>
<td></td>
<td>• Good heat-shock resistance</td>
<td>• Electric components for automobile</td>
</tr>
</tbody>
</table>

### Features
- **High resistance to overload and cut-through**
- **Good heat-shock resistance**

### Applications
- High voltage transformers for micro-wave oven
- Electric components for automobile

---

### Specifications

**AI-EIW**
- Specification: NEMA MW35-C
- Thermal index: N (200°C)
- UL file number: E84441
- Product range: 0.2 ~ 3.2 mm

**MRW**
- Specification: NEMA MW35-C
- Thermal index: R (220°C)
- UL file number: E84441
- Product range: 0.2 ~ 3.2 mm

---

### Features
- **Increase efficiency of motor by High Space Factor**
- **Improve efficiency by optimized design for surface lubricity and toughness**
- **Provide excellent mechanical protection during winding and insertion**

### Applications
- Typical motor, Automobile component, Compressor
- High speed motor windings with difficult insertion and winding characteristics

---

### Specifications

#### EXLW-C
- Specification: JCS 334A
- Thermal index: C (220°C)
- UL file number: E84441
- Product range: 0.20 ~ 2.0 mm

#### EXLW-N
- Specification: NEMA MW35-C
- Thermal index: N (200°C)
- UL file number: E84441
- Product range: 0.2 ~ 2.5 mm

#### EXLW-P
- Specification: NEMA MW35-C
- Thermal index: N (200°C)
- UL file number: E84441
- Product range: 0.2 ~ 2.5 mm

---

### Features
- **Prolong the life of Inverter Driven Motor by using the strong material against the partial discharge**
- **High performance of scrape resistance**

### Applications
- Inverter Driven Motor: Motor for heavy electric machine, hybrid electric vehicle
## 2. Type of Enameled Wires

### 2. Double-Coated Enameled wires

#### EXLW-C
Polyamideimide Enameled Wire

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Polyamideimide (H Class, 1.5mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A / W</td>
</tr>
<tr>
<td>Film Thickness</td>
<td>mm</td>
<td>0.033</td>
</tr>
<tr>
<td>BDV</td>
<td>kV</td>
<td>12.0</td>
</tr>
<tr>
<td>Scrape Resistance (Unidirectional)</td>
<td>N</td>
<td>15.0</td>
</tr>
<tr>
<td>Static Friction Coefficient</td>
<td>-</td>
<td>0.085</td>
</tr>
<tr>
<td>Cut Through</td>
<td>ºC</td>
<td>420</td>
</tr>
</tbody>
</table>

#### Scrape Resistance

- 25.0 N
- 20.0 N
- 15.0 N
- 10.0 N

#### Lubricity

- 0.09
- 0.07
- 0.05
- 0.03
2. Type of Enameled Wires

2. Double-Coated Enameled Wires

**EXLW-N**
Polyamideimide Overcoated / Polyesterimide Enameled Wire

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>AI - EIW</th>
<th>EXLW - N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Film Thickness</td>
<td>mm</td>
<td>0.036</td>
<td>0.036</td>
</tr>
<tr>
<td>BDV</td>
<td>kV</td>
<td>13.0</td>
<td>13.5</td>
</tr>
<tr>
<td>Scrape Resistance (Unidirectional)</td>
<td>N</td>
<td>12.3</td>
<td>14.5</td>
</tr>
<tr>
<td>Static Friction Coefficient</td>
<td>-</td>
<td>0.085</td>
<td>0.045</td>
</tr>
<tr>
<td>Cut Through</td>
<td>ºC</td>
<td>391</td>
<td>420</td>
</tr>
</tbody>
</table>

Scrape Resistance

Lubricity
2. Type of Enamelled Wires

2 - 3. Litz Wires

**LZSW**  
H Class Litz Wire  

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>H(180°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td></td>
</tr>
<tr>
<td>Product range</td>
<td>0.12 ~ 0.3 mm (Single element wire)</td>
</tr>
</tbody>
</table>

**Features**  
- Superior characteristics at high frequency  
- Bondable by heating without impregnating  

**Applications**  
- High frequency applications  
- Deflection yoke coils for monitor  

**SLZSW**  
Solderable Litz Wire  

<table>
<thead>
<tr>
<th>Specification</th>
<th>LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal index</td>
<td>F(155°C)</td>
</tr>
<tr>
<td>UL file number</td>
<td></td>
</tr>
<tr>
<td>Product range</td>
<td>0.12 ~ 0.3 mm (Single element wire)</td>
</tr>
</tbody>
</table>

**Features**  
- Superior characteristics at high frequency  
- Bondable by heating without impregnating  
- Solderable without stripping off  

**Applications**  
- High frequency applications  
- Deflection yoke coils for monitor
DIMENSION OF ENAMELED WIRES
## 3 · 1. NEMA Standard

<table>
<thead>
<tr>
<th>AWG Size</th>
<th>Conductor</th>
<th>Single Build</th>
<th>Heavy Build</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(mm)</td>
<td>(inch)</td>
<td>(mm)</td>
</tr>
<tr>
<td>10</td>
<td>2.588</td>
<td>0.1019</td>
<td>2.601</td>
</tr>
<tr>
<td>11</td>
<td>2.304</td>
<td>0.0907</td>
<td>2.316</td>
</tr>
<tr>
<td>12</td>
<td>2.052</td>
<td>0.0808</td>
<td>2.062</td>
</tr>
<tr>
<td>13</td>
<td>1.829</td>
<td>0.0720</td>
<td>1.839</td>
</tr>
<tr>
<td>14</td>
<td>1.628</td>
<td>0.0641</td>
<td>1.636</td>
</tr>
<tr>
<td>15</td>
<td>1.450</td>
<td>0.0571</td>
<td>1.458</td>
</tr>
<tr>
<td>16</td>
<td>1.290</td>
<td>0.0508</td>
<td>1.298</td>
</tr>
<tr>
<td>17</td>
<td>1.151</td>
<td>0.0453</td>
<td>1.156</td>
</tr>
<tr>
<td>18</td>
<td>1.024</td>
<td>0.0403</td>
<td>1.029</td>
</tr>
<tr>
<td>19</td>
<td>0.912</td>
<td>0.0359</td>
<td>0.917</td>
</tr>
<tr>
<td>20</td>
<td>0.813</td>
<td>0.0320</td>
<td>0.818</td>
</tr>
<tr>
<td>21</td>
<td>0.724</td>
<td>0.0285</td>
<td>0.726</td>
</tr>
<tr>
<td>22</td>
<td>0.643</td>
<td>0.0253</td>
<td>0.645</td>
</tr>
<tr>
<td>23</td>
<td>0.574</td>
<td>0.0226</td>
<td>0.577</td>
</tr>
<tr>
<td>24</td>
<td>0.511</td>
<td>0.0201</td>
<td>0.513</td>
</tr>
<tr>
<td>25</td>
<td>0.455</td>
<td>0.0179</td>
<td>0.457</td>
</tr>
<tr>
<td>26</td>
<td>0.404</td>
<td>0.0159</td>
<td>0.406</td>
</tr>
<tr>
<td>27</td>
<td>0.361</td>
<td>0.0142</td>
<td>0.363</td>
</tr>
<tr>
<td>28</td>
<td>0.320</td>
<td>0.0126</td>
<td>0.323</td>
</tr>
<tr>
<td>29</td>
<td>0.287</td>
<td>0.0113</td>
<td>0.290</td>
</tr>
<tr>
<td>30</td>
<td>0.254</td>
<td>0.0100</td>
<td>0.257</td>
</tr>
<tr>
<td>31</td>
<td>0.226</td>
<td>0.0089</td>
<td>0.229</td>
</tr>
<tr>
<td>32</td>
<td>0.203</td>
<td>0.0080</td>
<td>0.206</td>
</tr>
<tr>
<td>33</td>
<td>0.180</td>
<td>0.0071</td>
<td>0.183</td>
</tr>
<tr>
<td>34</td>
<td>0.160</td>
<td>0.0063</td>
<td>0.163</td>
</tr>
<tr>
<td>35</td>
<td>0.142</td>
<td>0.0056</td>
<td>0.145</td>
</tr>
<tr>
<td>36</td>
<td>0.127</td>
<td>0.0050</td>
<td>0.130</td>
</tr>
<tr>
<td>37</td>
<td>0.114</td>
<td>0.0045</td>
<td>0.117</td>
</tr>
<tr>
<td>38</td>
<td>0.102</td>
<td>0.0040</td>
<td>0.104</td>
</tr>
<tr>
<td>39</td>
<td>0.089</td>
<td>0.0035</td>
<td>0.091</td>
</tr>
<tr>
<td>40</td>
<td>0.079</td>
<td>0.0031</td>
<td>0.081</td>
</tr>
<tr>
<td>41</td>
<td>0.071</td>
<td>0.0028</td>
<td>0.074</td>
</tr>
<tr>
<td>42</td>
<td>0.064</td>
<td>0.0025</td>
<td>0.066</td>
</tr>
</tbody>
</table>
### 3. Dimension of Enameled Wires

#### 3. BS (British Standard)

<table>
<thead>
<tr>
<th>Nom. (mm)</th>
<th>Min. (mm)</th>
<th>Max. (mm)</th>
<th>Min. Increase in Dia. (mm)</th>
<th>Max. Overall Dia. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.150</td>
<td>3.182</td>
<td>3.118</td>
<td>0.045</td>
<td>3.233</td>
</tr>
<tr>
<td>3.000</td>
<td>3.030</td>
<td>2.970</td>
<td>0.045</td>
<td>3.083</td>
</tr>
<tr>
<td>2.800</td>
<td>2.828</td>
<td>2.772</td>
<td>0.043</td>
<td>2.880</td>
</tr>
<tr>
<td>2.650</td>
<td>2.677</td>
<td>2.623</td>
<td>0.043</td>
<td>2.730</td>
</tr>
<tr>
<td>2.500</td>
<td>2.525</td>
<td>2.475</td>
<td>0.042</td>
<td>2.578</td>
</tr>
<tr>
<td>2.360</td>
<td>2.384</td>
<td>2.336</td>
<td>0.042</td>
<td>2.438</td>
</tr>
<tr>
<td>2.240</td>
<td>2.262</td>
<td>2.218</td>
<td>0.041</td>
<td>2.316</td>
</tr>
<tr>
<td>2.120</td>
<td>2.141</td>
<td>2.099</td>
<td>0.041</td>
<td>2.196</td>
</tr>
<tr>
<td>2.000</td>
<td>2.020</td>
<td>1.980</td>
<td>0.040</td>
<td>2.074</td>
</tr>
<tr>
<td>1.900</td>
<td>1.919</td>
<td>1.881</td>
<td>0.040</td>
<td>1.974</td>
</tr>
<tr>
<td>1.800</td>
<td>1.818</td>
<td>1.782</td>
<td>0.039</td>
<td>1.872</td>
</tr>
<tr>
<td>1.700</td>
<td>1.717</td>
<td>1.683</td>
<td>0.039</td>
<td>1.772</td>
</tr>
<tr>
<td>1.600</td>
<td>1.616</td>
<td>1.584</td>
<td>0.038</td>
<td>1.670</td>
</tr>
<tr>
<td>1.500</td>
<td>1.515</td>
<td>1.485</td>
<td>0.038</td>
<td>1.570</td>
</tr>
<tr>
<td>1.400</td>
<td>1.414</td>
<td>1.386</td>
<td>0.036</td>
<td>1.468</td>
</tr>
<tr>
<td>1.320</td>
<td>1.333</td>
<td>1.307</td>
<td>0.036</td>
<td>1.388</td>
</tr>
<tr>
<td>1.250</td>
<td>1.263</td>
<td>1.237</td>
<td>0.035</td>
<td>1.316</td>
</tr>
<tr>
<td>1.180</td>
<td>1.192</td>
<td>1.168</td>
<td>0.035</td>
<td>1.246</td>
</tr>
<tr>
<td>1.120</td>
<td>1.131</td>
<td>1.109</td>
<td>0.034</td>
<td>1.184</td>
</tr>
<tr>
<td>1.060</td>
<td>1.071</td>
<td>1.049</td>
<td>0.034</td>
<td>1.124</td>
</tr>
<tr>
<td>1.000</td>
<td>1.010</td>
<td>0.990</td>
<td>0.034</td>
<td>1.064</td>
</tr>
<tr>
<td>0.950</td>
<td>0.960</td>
<td>0.940</td>
<td>0.034</td>
<td>1.012</td>
</tr>
<tr>
<td>0.900</td>
<td>0.909</td>
<td>0.891</td>
<td>0.032</td>
<td>0.959</td>
</tr>
<tr>
<td>0.850</td>
<td>0.859</td>
<td>0.841</td>
<td>0.032</td>
<td>0.909</td>
</tr>
<tr>
<td>0.800</td>
<td>0.808</td>
<td>0.792</td>
<td>0.030</td>
<td>0.855</td>
</tr>
<tr>
<td>0.750</td>
<td>0.758</td>
<td>0.742</td>
<td>0.030</td>
<td>0.805</td>
</tr>
<tr>
<td>0.710</td>
<td>0.717</td>
<td>0.703</td>
<td>0.028</td>
<td>0.762</td>
</tr>
<tr>
<td>0.670</td>
<td>0.677</td>
<td>0.663</td>
<td>0.028</td>
<td>0.722</td>
</tr>
<tr>
<td>0.630</td>
<td>0.636</td>
<td>0.624</td>
<td>0.027</td>
<td>0.679</td>
</tr>
<tr>
<td>0.600</td>
<td>0.606</td>
<td>0.594</td>
<td>0.027</td>
<td>0.649</td>
</tr>
<tr>
<td>0.560</td>
<td>0.566</td>
<td>0.554</td>
<td>0.025</td>
<td>0.606</td>
</tr>
<tr>
<td>0.530</td>
<td>0.536</td>
<td>0.524</td>
<td>0.025</td>
<td>0.576</td>
</tr>
<tr>
<td>0.500</td>
<td>0.505</td>
<td>0.496</td>
<td>0.024</td>
<td>0.546</td>
</tr>
<tr>
<td>0.475</td>
<td>0.480</td>
<td>0.470</td>
<td>0.024</td>
<td>0.519</td>
</tr>
<tr>
<td>0.450</td>
<td>0.455</td>
<td>0.445</td>
<td>0.022</td>
<td>0.491</td>
</tr>
<tr>
<td>0.425</td>
<td>0.430</td>
<td>0.420</td>
<td>0.022</td>
<td>0.466</td>
</tr>
<tr>
<td>0.400</td>
<td>0.405</td>
<td>0.395</td>
<td>0.021</td>
<td>0.439</td>
</tr>
<tr>
<td>0.375</td>
<td>0.380</td>
<td>0.370</td>
<td>0.021</td>
<td>0.414</td>
</tr>
<tr>
<td>0.355</td>
<td>0.359</td>
<td>0.351</td>
<td>0.020</td>
<td>0.392</td>
</tr>
<tr>
<td>0.335</td>
<td>0.339</td>
<td>0.331</td>
<td>0.020</td>
<td>0.372</td>
</tr>
<tr>
<td>0.315</td>
<td>0.319</td>
<td>0.311</td>
<td>0.019</td>
<td>0.349</td>
</tr>
<tr>
<td>0.300</td>
<td>0.304</td>
<td>0.296</td>
<td>0.019</td>
<td>0.334</td>
</tr>
<tr>
<td>0.280</td>
<td>0.284</td>
<td>0.276</td>
<td>0.018</td>
<td>0.312</td>
</tr>
<tr>
<td>0.265</td>
<td>0.269</td>
<td>0.261</td>
<td>0.018</td>
<td>0.279</td>
</tr>
<tr>
<td>0.250</td>
<td>0.254</td>
<td>0.246</td>
<td>0.017</td>
<td>0.281</td>
</tr>
<tr>
<td>0.236</td>
<td>0.240</td>
<td>0.232</td>
<td>0.017</td>
<td>0.267</td>
</tr>
<tr>
<td>0.224</td>
<td>0.227</td>
<td>0.221</td>
<td>0.016</td>
<td>0.252</td>
</tr>
<tr>
<td>0.212</td>
<td>0.215</td>
<td>0.209</td>
<td>0.015</td>
<td>0.240</td>
</tr>
<tr>
<td>0.200</td>
<td>0.203</td>
<td>0.197</td>
<td>0.014</td>
<td>0.226</td>
</tr>
<tr>
<td>0.190</td>
<td>0.193</td>
<td>0.187</td>
<td>0.014</td>
<td>0.216</td>
</tr>
<tr>
<td>0.180</td>
<td>0.183</td>
<td>0.177</td>
<td>0.013</td>
<td>0.204</td>
</tr>
<tr>
<td>0.170</td>
<td>0.173</td>
<td>0.167</td>
<td>0.013</td>
<td>0.194</td>
</tr>
<tr>
<td>0.160</td>
<td>0.163</td>
<td>0.157</td>
<td>0.012</td>
<td>0.182</td>
</tr>
<tr>
<td>0.150</td>
<td>0.153</td>
<td>0.147</td>
<td>0.012</td>
<td>0.171</td>
</tr>
<tr>
<td>0.140</td>
<td>0.143</td>
<td>0.137</td>
<td>0.011</td>
<td>0.160</td>
</tr>
<tr>
<td>0.132</td>
<td>0.135</td>
<td>0.129</td>
<td>0.011</td>
<td>0.152</td>
</tr>
<tr>
<td>0.125</td>
<td>0.128</td>
<td>0.122</td>
<td>0.010</td>
<td>0.144</td>
</tr>
<tr>
<td>0.112</td>
<td>0.115</td>
<td>0.109</td>
<td>0.009</td>
<td>0.130</td>
</tr>
<tr>
<td>0.100</td>
<td>0.103</td>
<td>0.097</td>
<td>0.008</td>
<td>0.117</td>
</tr>
</tbody>
</table>
### 3. Dimension of Enameled Wires

#### 3. KS(JIS) : Class 0(Zero) Enameled Wires

<table>
<thead>
<tr>
<th>Dia. (mm)</th>
<th>Tolerance of Dia. ±(mm)</th>
<th>Min. Thickness of Film (mm)</th>
<th>Max. Overall Dia (mm)</th>
<th>Max. Conductor Resistance $(\Omega/km)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.20</td>
<td>0.04</td>
<td>0.049</td>
<td>3.388</td>
<td>2.198</td>
</tr>
<tr>
<td>3.00</td>
<td>0.03</td>
<td>0.049</td>
<td>3.178</td>
<td>2.489</td>
</tr>
<tr>
<td>2.90</td>
<td>0.03</td>
<td>0.049</td>
<td>3.078</td>
<td>2.665</td>
</tr>
<tr>
<td>2.80</td>
<td>0.03</td>
<td>0.049</td>
<td>2.978</td>
<td>2.861</td>
</tr>
<tr>
<td>2.70</td>
<td>0.03</td>
<td>0.049</td>
<td>2.878</td>
<td>3.079</td>
</tr>
<tr>
<td>2.60</td>
<td>0.03</td>
<td>0.049</td>
<td>2.778</td>
<td>3.324</td>
</tr>
<tr>
<td>2.50</td>
<td>0.03</td>
<td>0.049</td>
<td>2.678</td>
<td>3.598</td>
</tr>
<tr>
<td>2.40</td>
<td>0.03</td>
<td>0.048</td>
<td>2.574</td>
<td>3.908</td>
</tr>
<tr>
<td>2.30</td>
<td>0.03</td>
<td>0.046</td>
<td>2.468</td>
<td>4.260</td>
</tr>
<tr>
<td>2.20</td>
<td>0.03</td>
<td>0.046</td>
<td>2.368</td>
<td>4.662</td>
</tr>
<tr>
<td>2.10</td>
<td>0.03</td>
<td>0.045</td>
<td>2.266</td>
<td>5.123</td>
</tr>
<tr>
<td>2.00</td>
<td>0.03</td>
<td>0.044</td>
<td>2.162</td>
<td>5.657</td>
</tr>
<tr>
<td>1.90</td>
<td>0.03</td>
<td>0.044</td>
<td>2.062</td>
<td>6.064</td>
</tr>
<tr>
<td>1.80</td>
<td>0.03</td>
<td>0.042</td>
<td>1.966</td>
<td>6.807</td>
</tr>
<tr>
<td>1.70</td>
<td>0.03</td>
<td>0.042</td>
<td>1.856</td>
<td>7.871</td>
</tr>
<tr>
<td>1.60</td>
<td>0.03</td>
<td>0.041</td>
<td>1.754</td>
<td>8.906</td>
</tr>
<tr>
<td>1.50</td>
<td>0.03</td>
<td>0.041</td>
<td>1.654</td>
<td>10.16</td>
</tr>
<tr>
<td>1.40</td>
<td>0.03</td>
<td>0.039</td>
<td>1.548</td>
<td>11.70</td>
</tr>
<tr>
<td>1.30</td>
<td>0.03</td>
<td>0.039</td>
<td>1.446</td>
<td>13.61</td>
</tr>
<tr>
<td>1.20</td>
<td>0.03</td>
<td>0.037</td>
<td>1.342</td>
<td>16.04</td>
</tr>
<tr>
<td>1.10</td>
<td>0.03</td>
<td>0.037</td>
<td>1.242</td>
<td>19.17</td>
</tr>
<tr>
<td>1.00</td>
<td>0.03</td>
<td>0.036</td>
<td>1.138</td>
<td>23.33</td>
</tr>
<tr>
<td>0.95</td>
<td>0.02</td>
<td>0.034</td>
<td>1.072</td>
<td>25.38</td>
</tr>
<tr>
<td>0.90</td>
<td>0.02</td>
<td>0.033</td>
<td>1.020</td>
<td>28.35</td>
</tr>
<tr>
<td>0.85</td>
<td>0.02</td>
<td>0.032</td>
<td>0.966</td>
<td>31.87</td>
</tr>
<tr>
<td>0.80</td>
<td>0.02</td>
<td>0.031</td>
<td>0.914</td>
<td>36.08</td>
</tr>
<tr>
<td>0.75</td>
<td>0.02</td>
<td>0.03</td>
<td>0.890</td>
<td>41.19</td>
</tr>
<tr>
<td>0.70</td>
<td>0.02</td>
<td>0.028</td>
<td>0.894</td>
<td>47.47</td>
</tr>
<tr>
<td>0.65</td>
<td>0.02</td>
<td>0.027</td>
<td>0.752</td>
<td>55.31</td>
</tr>
<tr>
<td>0.60</td>
<td>0.02</td>
<td>0.026</td>
<td>0.698</td>
<td>65.26</td>
</tr>
<tr>
<td>0.55</td>
<td>0.02</td>
<td>0.025</td>
<td>0.646</td>
<td>78.15</td>
</tr>
<tr>
<td>0.50</td>
<td>0.01</td>
<td>0.025</td>
<td>0.586</td>
<td>91.43</td>
</tr>
<tr>
<td>0.45</td>
<td>0.01</td>
<td>0.024</td>
<td>0.532</td>
<td>114.2</td>
</tr>
<tr>
<td>0.40</td>
<td>0.01</td>
<td>0.023</td>
<td>0.480</td>
<td>145.3</td>
</tr>
<tr>
<td>0.37</td>
<td>0.01</td>
<td>0.022</td>
<td>0.446</td>
<td>170.6</td>
</tr>
<tr>
<td>0.35</td>
<td>0.01</td>
<td>0.021</td>
<td>0.424</td>
<td>191.2</td>
</tr>
<tr>
<td>0.32</td>
<td>0.01</td>
<td>0.021</td>
<td>0.394</td>
<td>230.0</td>
</tr>
<tr>
<td>0.30</td>
<td>0.01</td>
<td>0.021</td>
<td>0.374</td>
<td>262.9</td>
</tr>
<tr>
<td>0.29</td>
<td>0.01</td>
<td>0.020</td>
<td>0.360</td>
<td>285.7</td>
</tr>
<tr>
<td>0.28</td>
<td>0.01</td>
<td>0.020</td>
<td>0.350</td>
<td>307.3</td>
</tr>
<tr>
<td>0.27</td>
<td>0.01</td>
<td>0.020</td>
<td>0.340</td>
<td>331.4</td>
</tr>
<tr>
<td>0.26</td>
<td>0.01</td>
<td>0.020</td>
<td>0.330</td>
<td>358.4</td>
</tr>
<tr>
<td>0.25</td>
<td>0.008</td>
<td>0.020</td>
<td>0.316</td>
<td>382.5</td>
</tr>
<tr>
<td>0.24</td>
<td>0.008</td>
<td>0.020</td>
<td>0.308</td>
<td>416.2</td>
</tr>
<tr>
<td>0.23</td>
<td>0.008</td>
<td>0.020</td>
<td>0.293</td>
<td>454.5</td>
</tr>
<tr>
<td>0.22</td>
<td>0.008</td>
<td>0.019</td>
<td>0.286</td>
<td>498.4</td>
</tr>
<tr>
<td>0.21</td>
<td>0.008</td>
<td>0.019</td>
<td>0.276</td>
<td>549.0</td>
</tr>
<tr>
<td>0.20</td>
<td>0.008</td>
<td>0.019</td>
<td>0.266</td>
<td>607.6</td>
</tr>
<tr>
<td>0.19</td>
<td>0.008</td>
<td>0.019</td>
<td>0.256</td>
<td>676.278</td>
</tr>
<tr>
<td>0.18</td>
<td>0.008</td>
<td>0.019</td>
<td>0.246</td>
<td>757.2</td>
</tr>
<tr>
<td>0.17</td>
<td>0.008</td>
<td>0.018</td>
<td>0.232</td>
<td>853.5</td>
</tr>
<tr>
<td>0.16</td>
<td>0.008</td>
<td>0.018</td>
<td>0.222</td>
<td>969.5</td>
</tr>
<tr>
<td>0.15</td>
<td>0.008</td>
<td>0.017</td>
<td>0.210</td>
<td>1111.0</td>
</tr>
<tr>
<td>0.14</td>
<td>0.008</td>
<td>0.017</td>
<td>0.200</td>
<td>1286.0</td>
</tr>
<tr>
<td>0.13</td>
<td>0.008</td>
<td>0.017</td>
<td>0.190</td>
<td>1506.0</td>
</tr>
<tr>
<td>0.12</td>
<td>0.008</td>
<td>0.017</td>
<td>0.180</td>
<td>1786.0</td>
</tr>
<tr>
<td>0.11</td>
<td>0.008</td>
<td>0.016</td>
<td>0.166</td>
<td>2153.0</td>
</tr>
<tr>
<td>0.10</td>
<td>0.008</td>
<td>0.016</td>
<td>0.156</td>
<td>2547.0</td>
</tr>
</tbody>
</table>
3. Dimension of Enameled Wires

### 3.4. KS(JIS) : Class 1 Enameled Wires

<table>
<thead>
<tr>
<th>Conductor Dia. (mm)</th>
<th>Min. Thickness of Film (mm)</th>
<th>Max. Overall Dia. (mm)</th>
<th>Max. Conductor Resistance (Ω/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.20</td>
<td>±0.04</td>
<td>0.034</td>
<td>3.338</td>
</tr>
<tr>
<td>3.00</td>
<td>±0.03</td>
<td>0.034</td>
<td>3.128</td>
</tr>
<tr>
<td>2.90</td>
<td>±0.03</td>
<td>0.034</td>
<td>3.028</td>
</tr>
<tr>
<td>2.80</td>
<td>±0.03</td>
<td>0.034</td>
<td>2.928</td>
</tr>
<tr>
<td>2.70</td>
<td>±0.03</td>
<td>0.034</td>
<td>2.828</td>
</tr>
<tr>
<td>2.60</td>
<td>±0.03</td>
<td>0.034</td>
<td>2.728</td>
</tr>
<tr>
<td>2.50</td>
<td>±0.03</td>
<td>0.034</td>
<td>2.628</td>
</tr>
<tr>
<td>2.40</td>
<td>±0.03</td>
<td>0.033</td>
<td>2.526</td>
</tr>
<tr>
<td>2.30</td>
<td>±0.03</td>
<td>0.032</td>
<td>2.422</td>
</tr>
<tr>
<td>2.20</td>
<td>±0.03</td>
<td>0.032</td>
<td>2.322</td>
</tr>
<tr>
<td>2.10</td>
<td>±0.03</td>
<td>0.031</td>
<td>2.220</td>
</tr>
<tr>
<td>2.00</td>
<td>±0.03</td>
<td>0.030</td>
<td>2.118</td>
</tr>
<tr>
<td>1.90</td>
<td>±0.03</td>
<td>0.030</td>
<td>2.018</td>
</tr>
<tr>
<td>1.80</td>
<td>±0.03</td>
<td>0.029</td>
<td>1.914</td>
</tr>
<tr>
<td>1.70</td>
<td>±0.03</td>
<td>0.029</td>
<td>1.814</td>
</tr>
<tr>
<td>1.60</td>
<td>±0.03</td>
<td>0.028</td>
<td>1.712</td>
</tr>
<tr>
<td>1.50</td>
<td>±0.03</td>
<td>0.028</td>
<td>1.612</td>
</tr>
<tr>
<td>1.40</td>
<td>±0.03</td>
<td>0.027</td>
<td>1.508</td>
</tr>
<tr>
<td>1.30</td>
<td>±0.03</td>
<td>0.027</td>
<td>1.408</td>
</tr>
<tr>
<td>1.20</td>
<td>±0.03</td>
<td>0.026</td>
<td>1.304</td>
</tr>
<tr>
<td>1.10</td>
<td>±0.03</td>
<td>0.026</td>
<td>1.204</td>
</tr>
<tr>
<td>1.00</td>
<td>±0.03</td>
<td>0.025</td>
<td>1.102</td>
</tr>
<tr>
<td>0.95</td>
<td>±0.02</td>
<td>0.024</td>
<td>1.038</td>
</tr>
<tr>
<td>0.90</td>
<td>±0.02</td>
<td>0.023</td>
<td>0.986</td>
</tr>
<tr>
<td>0.95</td>
<td>±0.02</td>
<td>0.022</td>
<td>0.934</td>
</tr>
<tr>
<td>0.80</td>
<td>±0.02</td>
<td>0.021</td>
<td>0.882</td>
</tr>
<tr>
<td>0.75</td>
<td>±0.02</td>
<td>0.020</td>
<td>0.830</td>
</tr>
<tr>
<td>0.70</td>
<td>±0.02</td>
<td>0.019</td>
<td>0.776</td>
</tr>
<tr>
<td>0.65</td>
<td>±0.02</td>
<td>0.018</td>
<td>0.724</td>
</tr>
<tr>
<td>0.60</td>
<td>±0.02</td>
<td>0.017</td>
<td>0.672</td>
</tr>
<tr>
<td>0.55</td>
<td>±0.02</td>
<td>0.017</td>
<td>0.620</td>
</tr>
<tr>
<td>0.50</td>
<td>±0.01</td>
<td>0.017</td>
<td>0.560</td>
</tr>
<tr>
<td>0.45</td>
<td>±0.01</td>
<td>0.016</td>
<td>0.508</td>
</tr>
<tr>
<td>0.40</td>
<td>±0.01</td>
<td>0.015</td>
<td>0.456</td>
</tr>
<tr>
<td>0.37</td>
<td>±0.01</td>
<td>0.014</td>
<td>0.424</td>
</tr>
<tr>
<td>0.35</td>
<td>±0.01</td>
<td>0.014</td>
<td>0.402</td>
</tr>
<tr>
<td>0.32</td>
<td>±0.01</td>
<td>0.014</td>
<td>0.372</td>
</tr>
<tr>
<td>0.30</td>
<td>±0.01</td>
<td>0.014</td>
<td>0.352</td>
</tr>
<tr>
<td>0.29</td>
<td>±0.01</td>
<td>0.013</td>
<td>0.340</td>
</tr>
<tr>
<td>0.28</td>
<td>±0.01</td>
<td>0.013</td>
<td>0.330</td>
</tr>
<tr>
<td>0.27</td>
<td>±0.01</td>
<td>0.013</td>
<td>0.320</td>
</tr>
<tr>
<td>0.26</td>
<td>±0.01</td>
<td>0.013</td>
<td>0.310</td>
</tr>
<tr>
<td>0.25</td>
<td>±0.01</td>
<td>0.013</td>
<td>0.298</td>
</tr>
<tr>
<td>0.24</td>
<td>±0.01</td>
<td>0.013</td>
<td>0.288</td>
</tr>
<tr>
<td>0.23</td>
<td>±0.01</td>
<td>0.013</td>
<td>0.278</td>
</tr>
<tr>
<td>0.22</td>
<td>±0.01</td>
<td>0.012</td>
<td>0.266</td>
</tr>
<tr>
<td>0.21</td>
<td>±0.01</td>
<td>0.012</td>
<td>0.256</td>
</tr>
<tr>
<td>0.20</td>
<td>±0.01</td>
<td>0.012</td>
<td>0.246</td>
</tr>
<tr>
<td>0.19</td>
<td>±0.01</td>
<td>0.012</td>
<td>0.236</td>
</tr>
<tr>
<td>0.18</td>
<td>±0.01</td>
<td>0.012</td>
<td>0.226</td>
</tr>
<tr>
<td>0.17</td>
<td>±0.01</td>
<td>0.011</td>
<td>0.214</td>
</tr>
<tr>
<td>0.16</td>
<td>±0.01</td>
<td>0.011</td>
<td>0.204</td>
</tr>
<tr>
<td>0.15</td>
<td>±0.01</td>
<td>0.010</td>
<td>0.192</td>
</tr>
<tr>
<td>0.14</td>
<td>±0.01</td>
<td>0.010</td>
<td>0.182</td>
</tr>
<tr>
<td>0.13</td>
<td>±0.01</td>
<td>0.010</td>
<td>0.172</td>
</tr>
<tr>
<td>0.12</td>
<td>±0.01</td>
<td>0.010</td>
<td>0.162</td>
</tr>
<tr>
<td>0.11</td>
<td>±0.01</td>
<td>0.009</td>
<td>0.150</td>
</tr>
<tr>
<td>0.10</td>
<td>±0.01</td>
<td>0.009</td>
<td>0.140</td>
</tr>
</tbody>
</table>

Conductor Dia. | Tolerance of Dia. | Min. Thickness of Film | Max. Overall Dia. | Max. Conductor Resistance (Ω/km)
### 3. Dimension of Enameled Wires

#### 3.5. KS(JIS) : Class 2 Enameled Wires

<table>
<thead>
<tr>
<th>Conductor Dia. (mm)</th>
<th>Tolerance of Dia. ±(mm)</th>
<th>Min. Thickness of Film (mm)</th>
<th>Max. Overall Dia. (mm)</th>
<th>Max. Conductor Resistance (Ω/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10</td>
<td>0.012</td>
<td>0.017</td>
<td>1.062</td>
<td>22.49</td>
</tr>
<tr>
<td>0.09</td>
<td>0.010</td>
<td>0.017</td>
<td>1.008</td>
<td>24.84</td>
</tr>
<tr>
<td>0.08</td>
<td>0.010</td>
<td>0.016</td>
<td>0.956</td>
<td>27.71</td>
</tr>
<tr>
<td>0.07</td>
<td>0.010</td>
<td>0.015</td>
<td>0.904</td>
<td>31.11</td>
</tr>
<tr>
<td>0.06</td>
<td>0.010</td>
<td>0.015</td>
<td>0.852</td>
<td>35.17</td>
</tr>
<tr>
<td>0.05</td>
<td>0.008</td>
<td>0.014</td>
<td>0.798</td>
<td>39.87</td>
</tr>
<tr>
<td>0.04</td>
<td>0.008</td>
<td>0.013</td>
<td>0.746</td>
<td>45.84</td>
</tr>
<tr>
<td>0.03</td>
<td>0.008</td>
<td>0.012</td>
<td>0.694</td>
<td>53.26</td>
</tr>
<tr>
<td>0.02</td>
<td>0.008</td>
<td>0.012</td>
<td>0.644</td>
<td>62.64</td>
</tr>
<tr>
<td>0.01</td>
<td>0.006</td>
<td>0.012</td>
<td>0.592</td>
<td>74.18</td>
</tr>
<tr>
<td>0.005</td>
<td>0.005</td>
<td>0.010</td>
<td>0.542</td>
<td>89.95</td>
</tr>
<tr>
<td>0.005</td>
<td>0.005</td>
<td>0.011</td>
<td>0.490</td>
<td>112.1</td>
</tr>
<tr>
<td>0.005</td>
<td>0.005</td>
<td>0.011</td>
<td>0.439</td>
<td>141.7</td>
</tr>
<tr>
<td>0.005</td>
<td>0.005</td>
<td>0.010</td>
<td>0.407</td>
<td>165.9</td>
</tr>
<tr>
<td>0.005</td>
<td>0.005</td>
<td>0.010</td>
<td>0.387</td>
<td>185.7</td>
</tr>
<tr>
<td>0.005</td>
<td>0.005</td>
<td>0.010</td>
<td>0.357</td>
<td>222.8</td>
</tr>
<tr>
<td>0.005</td>
<td>0.005</td>
<td>0.010</td>
<td>0.337</td>
<td>254.0</td>
</tr>
<tr>
<td>0.005</td>
<td>0.004</td>
<td>0.009</td>
<td>0.324</td>
<td>273.9</td>
</tr>
<tr>
<td>0.005</td>
<td>0.004</td>
<td>0.009</td>
<td>0.314</td>
<td>294.1</td>
</tr>
<tr>
<td>0.005</td>
<td>0.004</td>
<td>0.009</td>
<td>0.304</td>
<td>316.6</td>
</tr>
<tr>
<td>0.004</td>
<td>0.004</td>
<td>0.009</td>
<td>0.294</td>
<td>341.8</td>
</tr>
<tr>
<td>0.004</td>
<td>0.004</td>
<td>0.009</td>
<td>0.284</td>
<td>370.2</td>
</tr>
<tr>
<td>0.004</td>
<td>0.004</td>
<td>0.009</td>
<td>0.274</td>
<td>402.2</td>
</tr>
<tr>
<td>0.004</td>
<td>0.004</td>
<td>0.009</td>
<td>0.264</td>
<td>438.6</td>
</tr>
<tr>
<td>0.004</td>
<td>0.004</td>
<td>0.008</td>
<td>0.252</td>
<td>480.1</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.008</td>
<td>0.241</td>
<td>522.8</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.008</td>
<td>0.231</td>
<td>577.2</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.008</td>
<td>0.221</td>
<td>640.6</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.008</td>
<td>0.211</td>
<td>715.0</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.007</td>
<td>0.199</td>
<td>803.2</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.007</td>
<td>0.189</td>
<td>908.8</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.006</td>
<td>0.177</td>
<td>1,037</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.006</td>
<td>0.167</td>
<td>1,193</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.006</td>
<td>0.157</td>
<td>1,389</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.006</td>
<td>0.147</td>
<td>1,636</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.005</td>
<td>0.135</td>
<td>1,957</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.005</td>
<td>0.125</td>
<td>2,381</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.005</td>
<td>0.113</td>
<td>2,959</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.005</td>
<td>0.103</td>
<td>3,778</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.004</td>
<td>0.091</td>
<td>4,990</td>
</tr>
<tr>
<td>0.003</td>
<td>0.003</td>
<td>0.004</td>
<td>0.081</td>
<td>6,966</td>
</tr>
</tbody>
</table>
### 3. Dimension of Enamelled Wires

#### 3.6. SBH-EIW (Class 0(Zero))

<table>
<thead>
<tr>
<th>Conductor Dia. (mm)</th>
<th>Tolerance of Dia. (±mm)</th>
<th>Min. Insulation Thickness of Film (mm)</th>
<th>Max. Bonding Thickness of Film (mm)</th>
<th>Overall Dia. Standard (mm)</th>
<th>Tolerance of Dia. (±mm)</th>
<th>20°C (Ω/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>0.003</td>
<td>0.017</td>
<td>0.006</td>
<td>0.254</td>
<td>0.003</td>
<td>577.1</td>
</tr>
<tr>
<td>0.22</td>
<td>0.003</td>
<td>0.017</td>
<td>0.006</td>
<td>0.274</td>
<td>0.003</td>
<td>480.1</td>
</tr>
<tr>
<td>0.24</td>
<td>0.003</td>
<td>0.017</td>
<td>0.006</td>
<td>0.297</td>
<td>0.003</td>
<td>402.2</td>
</tr>
<tr>
<td>0.26</td>
<td>0.004</td>
<td>0.018</td>
<td>0.007</td>
<td>0.318</td>
<td>0.003</td>
<td>341.8</td>
</tr>
<tr>
<td>0.28</td>
<td>0.004</td>
<td>0.018</td>
<td>0.007</td>
<td>0.338</td>
<td>0.003</td>
<td>285.3</td>
</tr>
<tr>
<td>0.30</td>
<td>0.004</td>
<td>0.018</td>
<td>0.007</td>
<td>0.358</td>
<td>0.003</td>
<td>254.0</td>
</tr>
<tr>
<td>0.32</td>
<td>0.004</td>
<td>0.019</td>
<td>0.007</td>
<td>0.380</td>
<td>0.003</td>
<td>228.8</td>
</tr>
<tr>
<td>0.35</td>
<td>0.004</td>
<td>0.021</td>
<td>0.008</td>
<td>0.416</td>
<td>0.003</td>
<td>185.7</td>
</tr>
<tr>
<td>0.37</td>
<td>0.004</td>
<td>0.019</td>
<td>0.008</td>
<td>0.432</td>
<td>0.003</td>
<td>165.9</td>
</tr>
<tr>
<td>0.38</td>
<td>0.004</td>
<td>0.019</td>
<td>0.008</td>
<td>0.442</td>
<td>0.003</td>
<td>158.2</td>
</tr>
<tr>
<td>0.40</td>
<td>0.004</td>
<td>0.021</td>
<td>0.008</td>
<td>0.466</td>
<td>0.004</td>
<td>141.7</td>
</tr>
<tr>
<td>0.42</td>
<td>0.005</td>
<td>0.021</td>
<td>0.008</td>
<td>0.486</td>
<td>0.004</td>
<td>124.5</td>
</tr>
<tr>
<td>0.43</td>
<td>0.005</td>
<td>0.023</td>
<td>0.008</td>
<td>0.500</td>
<td>0.004</td>
<td>118.8</td>
</tr>
<tr>
<td>0.45</td>
<td>0.005</td>
<td>0.024</td>
<td>0.008</td>
<td>0.522</td>
<td>0.004</td>
<td>112.1</td>
</tr>
<tr>
<td>0.47</td>
<td>0.005</td>
<td>0.024</td>
<td>0.008</td>
<td>0.542</td>
<td>0.004</td>
<td>102.7</td>
</tr>
<tr>
<td>0.50</td>
<td>0.005</td>
<td>0.024</td>
<td>0.008</td>
<td>0.572</td>
<td>0.004</td>
<td>90.59</td>
</tr>
</tbody>
</table>
### 3. Dimension of Enameled Wires

#### 3.7. GADW (GADWC)

<table>
<thead>
<tr>
<th>Conductor Dia. (mm)</th>
<th>Tolerance of Dia. ±(mm)</th>
<th>Finished Dia. Standard (mm)</th>
<th>Tolerance ±(mm)</th>
<th>Max. Conductor Resistance (Ω/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.34</td>
<td>0.006</td>
<td>0.385</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.395</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.36</td>
<td>0.006</td>
<td>0.406</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.37</td>
<td>0.006</td>
<td>0.417</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.38</td>
<td>0.006</td>
<td>0.427</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.39</td>
<td>0.006</td>
<td>0.438</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.40</td>
<td>0.006</td>
<td>0.449</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.41</td>
<td>0.006</td>
<td>0.459</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.42</td>
<td>0.006</td>
<td>0.469</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.43</td>
<td>0.006</td>
<td>0.479</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.44</td>
<td>0.006</td>
<td>0.49</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.45</td>
<td>0.006</td>
<td>0.501</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.46</td>
<td>0.006</td>
<td>0.511</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.47</td>
<td>0.006</td>
<td>0.521</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.48</td>
<td>0.006</td>
<td>0.528</td>
<td>+0.005</td>
<td>-0.004</td>
</tr>
<tr>
<td>0.49</td>
<td>0.006</td>
<td>0.538</td>
<td>±0.006</td>
<td>153.6</td>
</tr>
<tr>
<td>0.50</td>
<td>0.007</td>
<td>0.548</td>
<td>±0.006</td>
<td>148.1</td>
</tr>
<tr>
<td>0.51</td>
<td>0.007</td>
<td>0.558</td>
<td>±0.006</td>
<td>142.2</td>
</tr>
<tr>
<td>0.52</td>
<td>0.007</td>
<td>0.568</td>
<td>±0.006</td>
<td>136.7</td>
</tr>
<tr>
<td>0.53</td>
<td>0.007</td>
<td>0.578</td>
<td>±0.006</td>
<td>131.6</td>
</tr>
<tr>
<td>0.54</td>
<td>0.007</td>
<td>0.588</td>
<td>±0.006</td>
<td>126.7</td>
</tr>
<tr>
<td>0.55</td>
<td>0.007</td>
<td>0.598</td>
<td>±0.006</td>
<td>122.1</td>
</tr>
<tr>
<td>0.60</td>
<td>0.012</td>
<td>0.65</td>
<td>±0.006</td>
<td>103.0</td>
</tr>
<tr>
<td>0.70</td>
<td>0.012</td>
<td>0.968</td>
<td>±0.011</td>
<td>45.64</td>
</tr>
<tr>
<td>0.95</td>
<td>0.012</td>
<td>1.018</td>
<td>±0.011</td>
<td>40.90</td>
</tr>
<tr>
<td>1.00</td>
<td>0.012</td>
<td>1.076</td>
<td>±0.014</td>
<td>36.87</td>
</tr>
<tr>
<td>1.10</td>
<td>0.015</td>
<td>1.178</td>
<td>±0.014</td>
<td>30.57</td>
</tr>
<tr>
<td>1.15</td>
<td>0.015</td>
<td>1.228</td>
<td>±0.014</td>
<td>27.94</td>
</tr>
<tr>
<td>1.20</td>
<td>0.015</td>
<td>1.278</td>
<td>±0.014</td>
<td>25.63</td>
</tr>
<tr>
<td>1.25</td>
<td>0.015</td>
<td>1.331</td>
<td>±0.014</td>
<td>23.59</td>
</tr>
<tr>
<td>1.30</td>
<td>0.015</td>
<td>1.381</td>
<td>±0.014</td>
<td>21.79</td>
</tr>
<tr>
<td>1.35</td>
<td>0.015</td>
<td>1.431</td>
<td>±0.014</td>
<td>20.19</td>
</tr>
<tr>
<td>1.40</td>
<td>0.015</td>
<td>1.481</td>
<td>±0.015</td>
<td>18.76</td>
</tr>
<tr>
<td>1.45</td>
<td>0.015</td>
<td>1.534</td>
<td>±0.015</td>
<td>17.48</td>
</tr>
<tr>
<td>1.50</td>
<td>0.015</td>
<td>1.584</td>
<td>±0.015</td>
<td>16.33</td>
</tr>
<tr>
<td>1.55</td>
<td>0.015</td>
<td>1.634</td>
<td>±0.015</td>
<td>15.27</td>
</tr>
<tr>
<td>1.60</td>
<td>0.015</td>
<td>1.684</td>
<td>±0.015</td>
<td>14.32</td>
</tr>
<tr>
<td>1.65</td>
<td>0.015</td>
<td>1.735</td>
<td>±0.015</td>
<td>13.46</td>
</tr>
<tr>
<td>1.70</td>
<td>0.015</td>
<td>1.786</td>
<td>±0.015</td>
<td>12.68</td>
</tr>
<tr>
<td>1.75</td>
<td>0.015</td>
<td>1.838</td>
<td>±0.015</td>
<td>11.96</td>
</tr>
<tr>
<td>1.80</td>
<td>0.015</td>
<td>1.896</td>
<td>±0.015</td>
<td>11.29</td>
</tr>
</tbody>
</table>
### 3. Dimension of Enameled Wires

**3. 8. Litz Wires**

<table>
<thead>
<tr>
<th>Type</th>
<th>Single Element Wire</th>
<th>Stranded Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conductor Dia.</td>
<td>Tolerance</td>
</tr>
<tr>
<td></td>
<td>(mm)</td>
<td>±(mm)</td>
</tr>
<tr>
<td>LZSW08</td>
<td>0.12</td>
<td>0.003</td>
</tr>
<tr>
<td>LZSW08</td>
<td>0.13</td>
<td>0.003</td>
</tr>
<tr>
<td>LZSW07</td>
<td>0.14</td>
<td>0.003</td>
</tr>
<tr>
<td>LZSW08</td>
<td>0.14</td>
<td>0.003</td>
</tr>
<tr>
<td>LZSW07</td>
<td>0.16</td>
<td>0.003</td>
</tr>
<tr>
<td>LZSW08</td>
<td>0.16</td>
<td>0.003</td>
</tr>
<tr>
<td>SLZSW07</td>
<td>0.14</td>
<td>0.003</td>
</tr>
<tr>
<td>SLZSW10</td>
<td>0.15</td>
<td>0.003</td>
</tr>
<tr>
<td>SLZSW11</td>
<td>0.15</td>
<td>0.003</td>
</tr>
<tr>
<td>SLZSW07</td>
<td>0.16</td>
<td>0.003</td>
</tr>
<tr>
<td>SLZSW08</td>
<td>0.16</td>
<td>0.003</td>
</tr>
</tbody>
</table>

**Structure**

- **Single Element Wire**
  - Bonding Layer
  - Insulation Layer
  - Conductor

- **Stranded Wire**
  - Bonding Layer
  - Insulation Layer
  - Conductor

### 2) Characteristics of Rac / Rdc vs frequency change

![Graph showing characteristics of Rac / Rdc vs frequency change](image)

- **LZ07 0.12mm (Litz Wire)**
- **0.24 X 10 Cores (Multi Wire)**
- **0.47mm (Solid Wire)**
04
ENGINEERING DATA
# 4. Engineering Data

## 4.1. Solvent Resistance of Enameled Wires

<table>
<thead>
<tr>
<th>Type of Solvent</th>
<th>Temperature of Solvent</th>
<th>PVF Cheese Cloth</th>
<th>PVF Nail</th>
<th>UEW Cheese Cloth</th>
<th>UEW Nail</th>
<th>PEW, EIW Cheese Cloth</th>
<th>PEW, EIW Nail</th>
<th>AIW Cloth</th>
<th>AIW Nail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanol</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Ethanol</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Butanol</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Naphtha</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Tung Oil</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Turpentine</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>20°C Gasoline</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Benzol</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Cresol</td>
<td></td>
<td>○ ×</td>
<td>○</td>
<td>△ ○</td>
<td>△</td>
<td>○ ○</td>
<td>○ ○</td>
<td>N.T</td>
<td>N.T</td>
</tr>
<tr>
<td>Naphtha (5) + Butanol (5)</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Benzol (5) + Butanol (5)</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Naphtha (5) + Benzol (5)</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Naphtha (5) + Gasoline (5)</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Solvent</th>
<th>Temperature of Solvent</th>
<th>PVF Cheese Cloth</th>
<th>PVF Nail</th>
<th>UEW Cheese Cloth</th>
<th>UEW Nail</th>
<th>PEW, EIW Cheese Cloth</th>
<th>PEW, EIW Nail</th>
<th>AIW Cloth</th>
<th>AIW Nail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanol</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Ethanol</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Butanol</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Naphtha</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Tung Oil</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Turpentine</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>65°C Gasoline</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Benzol</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Cresol</td>
<td></td>
<td>○ ×</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>N.T</td>
<td>N.T</td>
</tr>
<tr>
<td>Naphtha (5) + Butanol (5)</td>
<td></td>
<td>○ ×</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Benzol (5) + Butanol (5)</td>
<td></td>
<td>○ ×</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Naphtha (5) + Benzol (5)</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
<tr>
<td>Naphtha (5) + Gasoline (5)</td>
<td></td>
<td>○ ○</td>
<td>○</td>
<td>△ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
<td>○ ○</td>
</tr>
</tbody>
</table>

※ Symbol : ○ Acceptable for use △ Not recommendable ○ Usable after examining × Unusable N.T : No Test.
### 4. Engineering Data

#### 4.2. Properties of Various Enameled Wires After Being Elongated

<table>
<thead>
<tr>
<th>Type</th>
<th>Elongation (%)</th>
<th>Dimension (mm)</th>
<th>Pinhole (No./5m)</th>
<th>Mandrel wound</th>
<th>Dielectric Strength (V)</th>
<th>Number of Torsion (Adhesion)</th>
<th>Number of Scrape Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Conductor Dia.</td>
<td>Film Thickness</td>
<td>Overall Dia.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1.000</td>
<td>0.041</td>
<td>1.082</td>
<td>0 × 1/0/3</td>
<td>9,780</td>
<td>88.5</td>
<td>151.8</td>
</tr>
<tr>
<td>3</td>
<td>0.985</td>
<td>0.040</td>
<td>1.064</td>
<td>0 × 1/0/3</td>
<td>9,600</td>
<td>86.3</td>
<td>136.3</td>
</tr>
<tr>
<td>PVF</td>
<td>6</td>
<td>0.974</td>
<td>0.040</td>
<td>1.054</td>
<td>9,480</td>
<td>86.1</td>
<td>135.8</td>
</tr>
<tr>
<td>9</td>
<td>0.962</td>
<td>0.039</td>
<td>1.040</td>
<td>0 × 1/0/3</td>
<td>9,460</td>
<td>85.1</td>
<td>135.2</td>
</tr>
<tr>
<td>12</td>
<td>0.947</td>
<td>0.039</td>
<td>1.025</td>
<td>0 × 1/0/3</td>
<td>9,350</td>
<td>81.0</td>
<td>134.8</td>
</tr>
<tr>
<td>0</td>
<td>0.997</td>
<td>0.044</td>
<td>1.084</td>
<td>0 × 1/0/3</td>
<td>9,990</td>
<td>101.3</td>
<td>34.2</td>
</tr>
<tr>
<td>3</td>
<td>0.983</td>
<td>0.044</td>
<td>1.070</td>
<td>0 × 1/0/3</td>
<td>9,830</td>
<td>99.5</td>
<td>34.3</td>
</tr>
<tr>
<td>UEW</td>
<td>6</td>
<td>0.970</td>
<td>0.043</td>
<td>1.056</td>
<td>9,050</td>
<td>93.9</td>
<td>29.2</td>
</tr>
<tr>
<td>9</td>
<td>0.968</td>
<td>0.042</td>
<td>1.041</td>
<td>0 × 1/0/3</td>
<td>8,600</td>
<td>92.9</td>
<td>28.5</td>
</tr>
<tr>
<td>12</td>
<td>0.945</td>
<td>0.041</td>
<td>1.027</td>
<td>0 × 1/0/3</td>
<td>8,690</td>
<td>91.6</td>
<td>25.2</td>
</tr>
<tr>
<td>0</td>
<td>1.002</td>
<td>0.041</td>
<td>1.083</td>
<td>0 × 1/0/3</td>
<td>10,970</td>
<td>100.4</td>
<td>91.5</td>
</tr>
<tr>
<td>3</td>
<td>0.998</td>
<td>0.041</td>
<td>1.069</td>
<td>0 × 1/0/3</td>
<td>10,160</td>
<td>97.0</td>
<td>67.7</td>
</tr>
<tr>
<td>PEW</td>
<td>6</td>
<td>0.975</td>
<td>0.040</td>
<td>1.054</td>
<td>9,800</td>
<td>94.0</td>
<td>59.3</td>
</tr>
<tr>
<td>9</td>
<td>0.964</td>
<td>0.039</td>
<td>1.041</td>
<td>0 × 1/0/3</td>
<td>9,630</td>
<td>91.9</td>
<td>56.8</td>
</tr>
<tr>
<td>12</td>
<td>0.949</td>
<td>0.039</td>
<td>1.026</td>
<td>0 × 1/0/3</td>
<td>9,510</td>
<td>90.0</td>
<td>50.8</td>
</tr>
<tr>
<td>0</td>
<td>1.002</td>
<td>0.043</td>
<td>1.088</td>
<td>0 × 1/0/3</td>
<td>11,500</td>
<td>89.1</td>
<td>63.1</td>
</tr>
<tr>
<td>3</td>
<td>0.987</td>
<td>0.042</td>
<td>1.071</td>
<td>0 × 1/0/3</td>
<td>11,400</td>
<td>87.4</td>
<td>59.1</td>
</tr>
<tr>
<td>EIW</td>
<td>6</td>
<td>0.974</td>
<td>0.042</td>
<td>1.058</td>
<td>11,300</td>
<td>86.0</td>
<td>57.0</td>
</tr>
<tr>
<td>9</td>
<td>0.960</td>
<td>0.041</td>
<td>1.042</td>
<td>0 × 1/0/3</td>
<td>11,200</td>
<td>84.1</td>
<td>55.6</td>
</tr>
<tr>
<td>12</td>
<td>0.947</td>
<td>0.039</td>
<td>1.025</td>
<td>0 × 1/0/3</td>
<td>10,800</td>
<td>82.3</td>
<td>39.0</td>
</tr>
<tr>
<td>0</td>
<td>1.000</td>
<td>0.043</td>
<td>1.086</td>
<td>0 × 1/0/3</td>
<td>11,600</td>
<td>71.8</td>
<td>69.2</td>
</tr>
<tr>
<td>3</td>
<td>0.988</td>
<td>0.042</td>
<td>1.072</td>
<td>0 × 1/0/3</td>
<td>11,400</td>
<td>70.1</td>
<td>57.0</td>
</tr>
<tr>
<td>AIW</td>
<td>6</td>
<td>0.976</td>
<td>0.041</td>
<td>1.058</td>
<td>11,250</td>
<td>68.5</td>
<td>51.4</td>
</tr>
<tr>
<td>9</td>
<td>0.965</td>
<td>0.041</td>
<td>1.047</td>
<td>0 × 1/0/3</td>
<td>11,100</td>
<td>67.4</td>
<td>43.1</td>
</tr>
<tr>
<td>12</td>
<td>0.950</td>
<td>0.040</td>
<td>1.030</td>
<td>0 × 1/0/3</td>
<td>10,830</td>
<td>65.6</td>
<td>38.5</td>
</tr>
</tbody>
</table>

*Test method. 1. Average value of 10 measurements  2. Numerator: Number of detective wires, Denominator: Number of specimens  3. Average value of a measurements by twist pair method  4. Gauge length: 200mm  5. Repeated scrape test*
## 4. Engineering Data

### 4.3. Critical Properties of Various Enameled Wires

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Wires</th>
<th>Test Condition</th>
<th>Not elongated</th>
<th>6% Elongated</th>
<th>12% Elongated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut through</td>
<td>PVF</td>
<td>Temperature Causing Short Circuit by heating for 6 hours</td>
<td>200~220°C</td>
<td>200~220°C</td>
<td>200~220°C</td>
</tr>
<tr>
<td></td>
<td>PEW</td>
<td></td>
<td>220~240°C</td>
<td>220~240°C</td>
<td>220~240°C</td>
</tr>
<tr>
<td></td>
<td>EW</td>
<td></td>
<td>250~300°C</td>
<td>250~300°C</td>
<td>250~300°C</td>
</tr>
<tr>
<td></td>
<td>AW</td>
<td></td>
<td>350~400°C</td>
<td>350~400°C</td>
<td>350~400°C</td>
</tr>
<tr>
<td>Heat shock</td>
<td>PVF</td>
<td>170°C, 1 hour</td>
<td>x1, OK</td>
<td>x1, OK</td>
<td>x1~3, OK</td>
</tr>
<tr>
<td></td>
<td>PEW</td>
<td>170°C, 1 hour</td>
<td>x3~5, OK</td>
<td>x3~5, OK</td>
<td>x1~3, OK</td>
</tr>
<tr>
<td></td>
<td>EW</td>
<td>250°C, 1 hour</td>
<td>x2~4, OK</td>
<td>x3~5, OK</td>
<td>x4, OK</td>
</tr>
<tr>
<td></td>
<td>AW</td>
<td>400°C, 1 hour</td>
<td>x1~3, OK</td>
<td>x3~5, OK</td>
<td>x1~3, OK</td>
</tr>
<tr>
<td>Aging(Flexibility)</td>
<td>PVF</td>
<td>6 hours after heating at 200°C</td>
<td>x2~3, OK</td>
<td>x1, OK</td>
<td>x1~3, OK</td>
</tr>
<tr>
<td></td>
<td>PEW</td>
<td>6 hours after heating at 200°C</td>
<td>x3~5, OK</td>
<td>x3~5, OK</td>
<td>x1~3, OK</td>
</tr>
<tr>
<td></td>
<td>EW</td>
<td>6 hours after heating at 200°C</td>
<td>x2~3, OK</td>
<td>x3~5, OK</td>
<td>x1~3, OK</td>
</tr>
<tr>
<td></td>
<td>AW</td>
<td>6 hours after heating at 200°C</td>
<td>x1~3, OK</td>
<td>x3~5, OK</td>
<td>x1~3, OK</td>
</tr>
</tbody>
</table>
4. Refrigerant Resistance of Various Enameled Wires

<table>
<thead>
<tr>
<th>Type of Enameled Wire</th>
<th>R-11</th>
<th>R-12</th>
<th>R-21</th>
<th>R-22</th>
<th>R-114</th>
<th>R-134a</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVF</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>×</td>
<td>○</td>
<td>×</td>
</tr>
<tr>
<td>RRW</td>
<td>○</td>
<td>○</td>
<td>△</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>PEW</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>○</td>
<td>○</td>
<td>△</td>
</tr>
<tr>
<td>UEW</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>○</td>
<td>○</td>
<td>△</td>
</tr>
<tr>
<td>EIW</td>
<td>○</td>
<td>○</td>
<td>△</td>
<td>○</td>
<td>○</td>
<td>△</td>
</tr>
<tr>
<td>AIW</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Notes: ○ Acceptable for use  △ Not recommendable  ○ Usable after examining  × Unusable

4. Crazing and Cure Effect of Various Enameled Wires

<table>
<thead>
<tr>
<th>Type of Enameled Wire</th>
<th>In Case of Sample Winding</th>
<th>In Case of After Immersion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>After Winding</td>
<td>After Heating for 30 Minutes at 120°C</td>
</tr>
<tr>
<td>PVF</td>
<td>3/10-5/10</td>
<td>0/10-1/10</td>
</tr>
<tr>
<td>EIW</td>
<td>2/10-3/10</td>
<td>0/10-1/10</td>
</tr>
<tr>
<td>UEW</td>
<td>0/10-2/10</td>
<td>0/10-1/10</td>
</tr>
<tr>
<td>PEW</td>
<td>0/10-1/10</td>
<td>0/10-1/10</td>
</tr>
</tbody>
</table>

- 32
### 4. Engineering Data

#### 4.6. Tension Table for Coiling

<table>
<thead>
<tr>
<th>Size (mm)</th>
<th>Tension (g)</th>
<th>Size (mm)</th>
<th>Tension (g)</th>
<th>Size (mm)</th>
<th>Tension (g)</th>
<th>Size (mm)</th>
<th>Tension (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02</td>
<td>5.1</td>
<td>0.18</td>
<td>225</td>
<td>0.35</td>
<td>745</td>
<td>0.80</td>
<td>3,170</td>
</tr>
<tr>
<td>0.025</td>
<td>7.1</td>
<td>0.19</td>
<td>248</td>
<td>0.36</td>
<td>785</td>
<td>0.85</td>
<td>3,520</td>
</tr>
<tr>
<td>0.03</td>
<td>10.2</td>
<td>0.2</td>
<td>272</td>
<td>0.37</td>
<td>824</td>
<td>0.90</td>
<td>3,880</td>
</tr>
<tr>
<td>0.04</td>
<td>17.3</td>
<td>0.21</td>
<td>292</td>
<td>0.38</td>
<td>864</td>
<td>1.0</td>
<td>4,630</td>
</tr>
<tr>
<td>0.05</td>
<td>25.5</td>
<td>0.22</td>
<td>333</td>
<td>0.39</td>
<td>903</td>
<td>1.1</td>
<td>5,283</td>
</tr>
<tr>
<td>0.06</td>
<td>33</td>
<td>0.23</td>
<td>356</td>
<td>0.40</td>
<td>946</td>
<td>1.2</td>
<td>6,120</td>
</tr>
<tr>
<td>0.07</td>
<td>43</td>
<td>0.24</td>
<td>380</td>
<td>0.42</td>
<td>1,024</td>
<td>1.3</td>
<td>7,220</td>
</tr>
<tr>
<td>0.08</td>
<td>54</td>
<td>0.25</td>
<td>412</td>
<td>0.43</td>
<td>1,068</td>
<td>1.4</td>
<td>8,221</td>
</tr>
<tr>
<td>0.09</td>
<td>65</td>
<td>0.26</td>
<td>441</td>
<td>0.45</td>
<td>1,160</td>
<td>1.5</td>
<td>9,200</td>
</tr>
<tr>
<td>0.10</td>
<td>78</td>
<td>0.27</td>
<td>470</td>
<td>0.47</td>
<td>1,250</td>
<td>1.6</td>
<td>10,200</td>
</tr>
<tr>
<td>0.11</td>
<td>93</td>
<td>0.28</td>
<td>503</td>
<td>0.48</td>
<td>1,295</td>
<td>1.7</td>
<td>11,220</td>
</tr>
<tr>
<td>0.12</td>
<td>106</td>
<td>0.29</td>
<td>535</td>
<td>0.50</td>
<td>1,395</td>
<td>1.8</td>
<td>12,342</td>
</tr>
<tr>
<td>0.13</td>
<td>125</td>
<td>0.3</td>
<td>565</td>
<td>0.55</td>
<td>1,660</td>
<td>1.9</td>
<td>13,464</td>
</tr>
<tr>
<td>0.14</td>
<td>143</td>
<td>0.31</td>
<td>600</td>
<td>0.60</td>
<td>1,925</td>
<td>2.0</td>
<td>14,790</td>
</tr>
<tr>
<td>0.15</td>
<td>161</td>
<td>0.32</td>
<td>635</td>
<td>0.65</td>
<td>2,220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.16</td>
<td>181</td>
<td>0.33</td>
<td>672</td>
<td>0.70</td>
<td>2,520</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.17</td>
<td>203</td>
<td>0.34</td>
<td>708</td>
<td>0.75</td>
<td>2,830</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
05

BOBBIN FOR ENAMELED WIRES
5. Bobbin for Enameled Wires

5.1. Bobbin Dimensions

<table>
<thead>
<tr>
<th>Type</th>
<th>Bobbin</th>
<th>Flange Dia.</th>
<th>Barrel Dia.</th>
<th>Inside Width</th>
<th>Flange Thickness</th>
<th>Hole Dia.</th>
<th>Width of Bobbin</th>
<th>Standard Weight of Enameled Wire Per Bobbin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic Bobbin</td>
<td>P-25</td>
<td>300</td>
<td>130</td>
<td>130</td>
<td>15</td>
<td>30</td>
<td>1.40</td>
<td>25</td>
</tr>
<tr>
<td>Plastic Taper Bobbin</td>
<td>PT-4</td>
<td>D1 124</td>
<td>d1 74</td>
<td>170</td>
<td>15</td>
<td>26</td>
<td>0.34</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>PT-10</td>
<td>D1 160</td>
<td>d1 96</td>
<td>200</td>
<td>15</td>
<td>30</td>
<td>0.60</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>PT-15</td>
<td>D1 180</td>
<td>d1 96</td>
<td>198</td>
<td>15</td>
<td>30</td>
<td>0.85</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>PT-25</td>
<td>D1 215</td>
<td>d1 110</td>
<td>250</td>
<td>15</td>
<td>34</td>
<td>0.93</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>PT-60</td>
<td>D1 270</td>
<td>d1 150</td>
<td>350</td>
<td>25</td>
<td>45</td>
<td>2.20</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>PT-100</td>
<td>D1 300</td>
<td>d1 180</td>
<td>425</td>
<td>38</td>
<td>100</td>
<td>4.35</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>PT-200</td>
<td>D1 375</td>
<td>d1 224</td>
<td>530</td>
<td>50</td>
<td>100</td>
<td>7.30</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>PT-400</td>
<td>D1 475</td>
<td>d1 280</td>
<td>670</td>
<td>65</td>
<td>100</td>
<td>15.00</td>
<td>400</td>
</tr>
</tbody>
</table>

Tolerance of net weight: ±30%
## 5. Bobbin for Enameled Wires

### 5.2. Bobbin Pattern for Enameled Wires

<table>
<thead>
<tr>
<th>Size</th>
<th>PT-4</th>
<th>PT-10</th>
<th>PT-15</th>
<th>PT-25</th>
<th>PT-60</th>
<th>PT-100</th>
<th>PT-200</th>
<th>PT-400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super Fine</td>
<td>0.05</td>
<td>0.06</td>
<td>0.07</td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.09</td>
<td>0.10</td>
<td>0.11</td>
<td>0.12</td>
<td>0.13</td>
<td>0.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine</td>
<td>0.15</td>
<td>0.18</td>
<td>0.20</td>
<td>0.25</td>
<td>0.30</td>
<td>0.35</td>
<td>0.40</td>
<td>0.45</td>
</tr>
<tr>
<td>Medium</td>
<td>0.55</td>
<td>0.60</td>
<td>0.70</td>
<td>0.80</td>
<td>0.90</td>
<td>1.00</td>
<td>1.10</td>
<td>1.20</td>
</tr>
<tr>
<td>Heavy</td>
<td>1.50</td>
<td>1.60</td>
<td>2.10</td>
<td>2.40</td>
<td>2.70</td>
<td>3.00</td>
<td>3.20</td>
<td></td>
</tr>
</tbody>
</table>
6. Notes and Warnings

Checklist and Precaution

1. General Checklist
   (1) Please check the following before coil winding
       (a) Are the wire diameter and type in accordance with the requirement?
       (b) Is there any oxidation on the conductor surface?
       (c) Is there any damage of the film during handling?
   (2) Please store the reset after coil winding so as to avoid the dust especially metal powder, moisture and the sun.
   (3) Please avoid the damage to product, which may cause the plastic bobbin to be broken.

2. Checklist for Enameled Wire
   Please be careful about the followings in case of enameled wire.
   (1) Minimize the elongation of the wire during coiling.
       Generally speaking, it is better to restrain the elongation up to maximum 5 % table 5 - 6 shows the tension versus elongation.
   (2) Please draw deep attention when selection the component impregnating varnish.
   (3) Don't spray the chemical solution, film stripper to the magnet wire.

3. Precaution during Coil
   (1) Avoid the damage caused by breaking. It is better to use rotating break instead of static break.
   (2) Please arrange the winding machine to avoid the damage or the decrease of the diameter of the wire.
   (3) Minimize the tension and elongation to the enameled wire during the winding and coiling.

4. Precaution after Winding
   (1) Please avoid the transformation of the coil shape, damage of the insulation material.
   (2) Please draw deep attention to the handling of the coil before varnish treatment.
   (3) Please avoid the dust especially metal powder, moisture during storing the coil.

Handling Instructions and Assurance Period

1. Handling Instruction
   (1) Caution at the port
       Keep dry and don't handle in the rain. Store indoor to avoid moisture damage.
   (2) Caution on board
       Keep dry.
       Don't store on deck.
   (3) Caution during inland transportations
       Keep dry.
       Don't tranship in the rain, not transport without water-proof cover on truck.
   (4) Caution during storage after delivery
       Keep dry.
       Keep clean to avoid the dust, especially metal powder. Don't be exposed to the sun.

2. Assurance Period
   Please recheck the properties of the wire, except for self-bonding type, when one year after manufacture.
   In case of self-bonding type, please recheck the properties when 6 months pass.
## Quality Certificates
### UL Recognition

### UL Wire Directory

**Magnetic Wire - Component**

**Manufacturer:** LG Cable Ltd

**Address:** ASAN TOWER, 15TH FL
150 SAMSUNG-DONG
GANGNAH-GU
SEOUL, 135-798 REPUBLIC OF KOREA

**Product Description:**

<table>
<thead>
<tr>
<th>Coax Type</th>
<th>ANRZ Type</th>
<th>T1</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW-28</td>
<td>10H4</td>
<td></td>
</tr>
<tr>
<td>MW-35</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>MW-79</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>MW-75C</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>MW-73C</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>MW-74</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>MW-73A</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>MW-35C</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

**Coating Types:**
- Polyethylene
- Polyamide
- Nylon
- Polyurethane
- Polyvinyl chloride
- Polyvinyl fluoride

**Coil Diameters:**

<table>
<thead>
<tr>
<th>Coax Type</th>
<th>ANRZ Type</th>
<th>T1</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW-28</td>
<td>10H4</td>
<td></td>
</tr>
<tr>
<td>MW-35</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>MW-79</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>MW-75C</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>MW-73C</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>MW-74</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>MW-73A</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>MW-35C</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

**Marking:**
- Company name and material designation and Recognition marking symbol on packages or retail containers.

**Questions?**

**Notice of Disclaimer**

The appearance of a company's name or product in this database does not in itself mean that products so identified have been manufactured under UL's Quality Assurance Services. The UL Mark should be considered to be listed and certified under UL's Quality Assurance Services. Always look for the Mark on the product.

UL permits the reproduction of the material contained in the UL database subject to the following conditions:

1. The material must be presented in its entirety and in a non-modifying manner, without any manipulation of the data (for example, 2. The statement: Reproduced from the Magnetic Wire Directory with permission of Underwriters Laboratories, Inc. Copyright © 2007 Underwriters Laboratories, Inc.)

2. The material must include a statement that the material is from the UL database.

3. The material must include a copyright notice in the following format: "Copyright © 2007 Underwriters Laboratories, Inc."
Products & Systems of LS Cable

Electronic Components & Materials
- Magnet Wire
- Copper Wire Rod
- Connector
- Lead Frame
- ACF
- Antenna
- Elastomer
- Copper Foil
- FCCL
- Heat Shrinkable Tube
- Ultracapacitor
- Automotive Wire & Cable
- Electronic Wire & Cable
- FA Cable
- High Frequency Coaxial Cable
- Micro Coaxial Cable

Industrial Machinery
- Tractor
- Air Conditioning System
- Injection Molding System
- Military Defense Equipment
Power Transmission & Distribution System
- Extra High Voltage Cable System
- Overhead Transmission Line System
- OPGW / Busduct System
- Onshore & Offshore Cable System
- Medium & Low Voltage Cable
- Control & Instrumentation Cable

Telecommunication System
- Optical Fiber
- Optical Fiber Cable
- RF Feeder Cable
- LAN Cable
- FTTH
- HFC (Hybrid Fiber Coaxial Cable)
**Branches**

- **Japan Office**
  E: 15th Fl, Akasaka Twin Tower 17-22, 2-Chome Akasaka, Minato-Ku, Tokyo, Japan
  Tel: +81-3-3582-9129  Fax: +81-3-3582-7363

- **Singapore Office**
  330 Beach Road #25-07 The Concourse, Singapore 199555
  Tel: +65-6342-6182-3  Fax: +65-6342-6164

- **India Office**
  C-1, 3rd Fl. Community Centre (Opp. ITT Cet), Safdarjung Development Area, New Delhi 110018 India
  Tel: +91-11-4602-1657,1658  Fax: +91-11-4602-1659

- **UAE Office**
  #302 Capricom Tower, Sheikh Zayed Rd., Dubai, UAE, PO Box 113736
  Tel: +971-4-333-6445  Fax: +971-4-333-6446

- **Jordan Office**
  #307 4th Fl. Midtown Plaza, Sweileh Subhi Al-Omari St.
  P.O. Box 81139 Amman 11155 Jordan
  Tel: +962-6-583-3367  Fax: +962-6-583-3359

- **Russia Office**
  Park Place Moscow 1133 Leninsky Prospekt E-711, Moscow 117198 Russia
  Tel: +7-495-956-5814  Fax: +7-495-955-5511

- **Slovakia Office**
  222 Rybnice 40, 831 07 Bratislava, Slovakia
  Tel: +421-2-3359-5213  Fax: +421-2-3359-5214

**Subsidiaries**

- **LSIC**: China Head Office
  12th Fl. Huamin Empore Plaza, 728 West Yanbin Rd., Shanghai 200050 China
  Tel: +86-21-5237-3369, 8997  Fax: +86-21-5237-8996

- **LSIC**: Beijing Office
  #25 B-17th Fl. Global Trade Center, 26 Beisanhuan Dong Rd, Dongcheng Di, Beijing, China
  Tel: +86-10-5225-5011  Fax: +86-10-5225-5015

- **LSCT**
  East of Jing-Jin, Express Yingshuo Toll Gate Beijing, Tianjin, China
  Tel: +86-22-2899-7919  Fax: +86-22-2899-7917

- **LSAS**
  Yu-Huangling Industrial Area, Xianghuang, Chengyang District, Qingdao, China
  Tel: +86-532-9689-9998  Fax: +86-532-9689-9993

- **LSA**
  Yu-Huangling Industrial Area, Xianghuang, Chengyang District, Qingdao, China
  Tel: +86-532-9689-2294  Fax: +86-532-9689-2294

- **LSMW**
  LS Industrial Park, Xin Mei Rd., New Dl. Wuai 214028, China
  Tel: +86-510-8238-0000  Fax: +86-510-8234-0001

- **LSVNA**
  So Dau Preint, Hong Bang Dl., Hai Phong, Vietnam
  Tel: +84-31-540250  Fax: +84-31-540241

- **LSC**
  Nhon Trach II, Lao Chau RZ, Nhon Trach District, Dong Nai Province, Hochimin, Vietnam
  Tel: +84-61-956-9307  Fax: +84-61-956-9306

- **LSCM**
  Suite 1A, Menara Norshah, 55 Jalan Sultan
  Ahmad Shah, Penang 10050 Malaysia
  Tel: +604-568-9609(34)  Fax: +604-568-9007

- **LSCA**
  925 Sylvan Avenue, Englewood Cliffs, NJ 07632, USA
  Tel: +1-201-616-2253  Fax: +1-201-810-2084

---

New Jersey (LSCA)