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Indian Standard

SPECIFICATION FOR
SILVER PALLADIUM ALLOY WIRE AND
STRIP FOR ELECTRICAL CONTACTS

UDC 669-225234-426:6213-066-6
Indian Standard

SPECIFICATION FOR
SILVER PALLADIUM ALLOY WIRE AND
STRIP FOR ELECTRICAL CONTACTS

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(Continued on page 2)
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<thead>
<tr>
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<th>Representing</th>
</tr>
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<tbody>
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<td>Ministry of Defence ( DGI )</td>
</tr>
<tr>
<td>SHBI C. R. SHAH</td>
<td>National Refinery Pvt Ltd, Bombay</td>
</tr>
<tr>
<td>SHBI S. P. SON AW ALA ( Alternate )</td>
<td>The Bombay Bullion Association Ltd, Bombay</td>
</tr>
<tr>
<td>SHBI SPTANTILAL NAB AND AS ( Alternate )</td>
<td>Tamil Nadu Jewellers' Federation, Madras</td>
</tr>
<tr>
<td>SHBI V. VANDAGOPAL</td>
<td>The Gem &amp; Jewellery Export Promotion Council, Bombay</td>
</tr>
<tr>
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<tr>
<td>SHBI NBMAL KUMAE RAKYAN ( Alternate )</td>
<td></td>
</tr>
<tr>
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SHBI A. B. Tewari Deputy Director ( Metals ), ISI

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**Convener**

SHBI A. W. CHAWATHE  
India Government Mint, Ministry of Finance

**Members**

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<tr>
<td>DaC. S. P. IYER</td>
<td>Bhabha Atomic Research Centre, Bombay</td>
</tr>
<tr>
<td>REPRESENTATIVE</td>
<td>Bharat Heavy Electricals Ltd, Hyderabad</td>
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<td>Amalgamated Components Pvt Ltd, New Delhi</td>
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<tr>
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Indian Standard
SPECIFICATION FOR
SILVER PALLADIUM ALLOY WIRE AND
STRIP FOR ELECTRICAL CONTACTS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 31 May 1984, after the draft finalized by the Precious Metals Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 Silver-palladium alloy wires and strips are used for electrical contacts in telecommunication equipment and other similar lower current applications.

0.3 Pure palladium has low electrical conductivity but highly resistant to corrosion, whereas pure silver has very good electrical conductivity and relatively poor resistance to corrosion. An alloy of about 70 percent silver and 30 percent palladium has proved to possess optimum electrical conductivity along with good corrosion resistance required for electrical contacts.

0.4 In preparing this standard, assistance has been derived from ASTM B 476-72 — General requirements for wrought precious metal electrical contact materials published by the American Society for Testing and Materials.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS: 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements for silver-palladium (30 percent palladium) alloy wire and strip used for electrical contacts.

*Rules for rounding off numerical values (revised).
IS : 11084 - 1984

2. SUPPLY OF MATERIAL

2.1 General requirements relating to the supply of material shall conform to IS : 1387-1967*.

3. TERMINOLOGY

3.0 For the purpose of this standard the following definitions shall apply.

3.1 Wire — Material in coil form and less than 0.635 mm in diameter.

3.2 Strip — Rolled flat product, 0.05 to 1.2 mm thick, width less than 152 mm.

4. CONDITION

4.1 The material shall be supplied in annealed condition.

5. REQUIREMENTS

5.1 General — The material shall be of required composition. The strip shall be wound one over the other without any damage. When un-rolled horizontally the strip shall lie flat.

5.2 Freedom from Defects — The wire or the strip shall be absolutely clean, shining, have good finish, free from oily material, wrinkles, curls, etc.

5.3 Chemical Composition — The material shall conform to the following chemical composition:

<table>
<thead>
<tr>
<th>Element</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver</td>
<td>69.5 to 70.5</td>
</tr>
<tr>
<td>Palladium</td>
<td>29.5 to 30.5</td>
</tr>
<tr>
<td>Impurities</td>
<td>0.5 Max</td>
</tr>
</tbody>
</table>

5.4 MECHANICAL PROPERTIES

5.4.1 Tensile Strength — The tensile strength of the material shall be between 255 to 335 MPa.

5.4.2 Elongation — The elongation shall be 20 percent minimum on a gauge length of 50 mm.

5.4.3 Hardness — The hardness of the material shall be between 60 and 100 HV.

♦ General requirements for the supply of metallurgical materials (first revision).
5.4.4 Reverse Bend Test — When tested in accordance with IS : 6878-1973*, using a Fillet of radius of 1.5 mm Min, the material shall withstand a minimum of 8 bends of 90° without showing any defect.

6. DIMENSIONS

6.1 The dimensions of the material (wire or strip) shall be as specified in purchase order.

7. TOLERANCES

7.1 Wires

7.1.1 Tolerance on diameter of wire:

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Tolerance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to and including 0.254</td>
<td>± 0.0025</td>
</tr>
<tr>
<td>Over 0.254</td>
<td>± 1 percent</td>
</tr>
</tbody>
</table>

7.2 Strips

7.2.1 Tolerance on thickness:

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>Tolerance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to and including 0.254</td>
<td>± 0.005</td>
</tr>
<tr>
<td>Over 0.254</td>
<td>± 0.010</td>
</tr>
</tbody>
</table>

7.2.2 Tolerance on width:

<table>
<thead>
<tr>
<th>Width (mm)</th>
<th>Tolerance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to and including 3.175</td>
<td>± 0.05</td>
</tr>
<tr>
<td>Over 3.175</td>
<td>± 0.075</td>
</tr>
</tbody>
</table>

8. CONDITION OF DELIVERY

8.1 The wire shall be delivered in coils weighing approximately 400 g with an eye diameter of about 10 cm. The winding of coils shall be uniform and layerwise.

8.2 The strips shall be in one continuous length rolled with an eye diameter of 10 cm and approximately weighing 400 g.

*Method of reverse bend testing of copper and copper alloy wire.
9. PACKING

9.1 The material shall be securely and suitable tied and packed with the same material.

10. SAMPLING

10.1 Lot — In a consignment, not more than 100 coils of silver palladium alloy wire and strip of the same composition and dimensions shall constitute a lot. From each lot, samples shall be drawn and tested for various requirements for ascertaining the conformity of the lot.

10.2 Visual and Dimensional Requirements — From each lot, the number of coils to be sampled for the purpose of examining freedom from defects and dimensional tolerances shall be as given below. The sample coils shall be selected at random (see IS : 4905-1968*):

<table>
<thead>
<tr>
<th>Lot Size</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 25</td>
<td>5</td>
</tr>
<tr>
<td>26 to 50</td>
<td>8</td>
</tr>
<tr>
<td>51 to 100</td>
<td>13</td>
</tr>
</tbody>
</table>

All the sample coils shall meet the respective requirements given in 5.2, 7, 8 and 9.

10.3 Chemical and Mechanical Properties — One test shall be conducted for chemical composition (5.3) and mechanical properties (5.4). The test results shall comply with the respective requirements if the lot is to be accepted under this clause.

11. TEST CERTIFICATE

11.1 A test certificate indicating the results of the test conducted as detailed in the specification shall be sent along with material;

12. MARKING

12.1 Each package shall be marked with the description of the material, net mass, dimensions of the material, number of wires or Strips in the bundle, batch number, month and year of manufacture, and name of the manufacturer and trade-mark, if any.

♦ Methods for random sampling.

6
12.1.1 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.
### INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

#### Base Units

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Unit</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>metre</td>
<td>m</td>
</tr>
<tr>
<td>Mass</td>
<td>kilogram</td>
<td>kg</td>
</tr>
<tr>
<td>Time</td>
<td>second</td>
<td>s</td>
</tr>
<tr>
<td>Electric current</td>
<td>ampere</td>
<td>A</td>
</tr>
<tr>
<td>Thermodynamic temperature</td>
<td>kelvin</td>
<td>K</td>
</tr>
<tr>
<td>Luminous intensity</td>
<td>candela</td>
<td>cd</td>
</tr>
<tr>
<td>Amount of substance</td>
<td>mole</td>
<td>mol</td>
</tr>
</tbody>
</table>

#### Supplementary Units

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Unit</th>
<th>Symbol</th>
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<tbody>
<tr>
<td>Plane angle</td>
<td>radian</td>
<td>rad</td>
</tr>
<tr>
<td>Solid angle</td>
<td>steradian</td>
<td>sr</td>
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#### Derived Units

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Unit</th>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force</td>
<td>newton</td>
<td>N</td>
<td>1 N = 1 kg·m/s²</td>
</tr>
<tr>
<td>Energy</td>
<td>joule</td>
<td>J</td>
<td>1 J = 1 N·m</td>
</tr>
<tr>
<td>Power</td>
<td>watt</td>
<td>W</td>
<td>1 W = 1 J/s</td>
</tr>
<tr>
<td>Flux</td>
<td>weber</td>
<td>Wb</td>
<td>1 Wb = 1 V·s</td>
</tr>
<tr>
<td>Flux density</td>
<td>tesla</td>
<td>T</td>
<td>1 T = 1 Wb/m²</td>
</tr>
<tr>
<td>Frequency</td>
<td>hertz</td>
<td>Hz</td>
<td>1 Hz = 1 c/s (s⁻¹)</td>
</tr>
<tr>
<td>Electric conductance</td>
<td>siemens</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Electromotive force</td>
<td>volt</td>
<td>V</td>
<td>1 V = 1 W/A</td>
</tr>
<tr>
<td>Pressure, stress</td>
<td>pascal</td>
<td>Pa</td>
<td>1 Pa = 1 N/m²</td>
</tr>
</tbody>
</table>
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