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**Electroplated coatings of silver
for engineering purposes**

ICS 25.220.40

Descriptors : silver, silver alloys, metal coatings, electroplating, silvering, industrial

Reference number : JIS H 8621 : 1998 (E)

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS H 8621 : 1993** is replaced with **JIS H 8621 : 1998**.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

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4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

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Electroplated coatings of silver for engineering purposes

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **ISO 4521** *Metallic coatings—Electrodeposited silver and silver alloy coatings for engineering purposes* issued in 1985, but items regarding the preparation of test pieces and marking which have not been specified in the corresponding International Standard are additionally specified in this Japanese Industrial Standard. In addition, the real atmospheric condition at subclause **10.7 Corrosion resistance test** is changed to the atmospheric condition in Japan (high temperature and high humidity).

1 Scope This Japanese Industrial Standard specifies the electroplated coatings of silver of 0.5 μm or over in thickness of the significant surface (hereafter referred to as “electroplated coatings”) conducted on metallic and nonmetallic basis materials for engineering purposes⁽¹⁾.

Note (1) The engineering purposes herein mean the functional applications in electrical, electronic, mechanical and other fields, each of which requires a particular performance of the product.

Remarks 1 This Standard shall apply only to formed parts.

2 The International Standard corresponding to this Standard is as follows:

ISO 4521 : 1985 *Metallic coatings—Electrodeposited silver and silver alloy coatings for engineering purposes*

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards indicated below shall be applied.

JIS C 0050 *Basic environmental testing procedures Part 2 : Tests, Test T : Soldering*

JIS H 0400 *Glossary of terms used in electroplating and related processes*

JIS H 0404 *Graphical symbol for electroplated coating*

JIS H 8501 *Methods of thickness test for metallic coatings*

JIS H 8502 *Methods of corrosion resistance test for metallic coatings*

JIS H 8503 *Methods of wear resistance test for metallic coatings*

JIS H 8504 *Methods of adhesion test for metallic coatings*

JIS K 8943 *Ammonium sulfide solution*

JIS Z 2244 *Vickers hardness test—Test method*

JIS Z 2251 *Knoop hardness test—Test method*

JIS Z 3282 *Soft solders*

ISO 4522 : 1985 *Metallic coatings—Test methods for electrodeposited silver and silver alloy coatings*

Part 1 : Determination of coating thickness

*Part 2 : Adhesion tests**Part 3 : Determination of the presence of residual salts*

3 Definitions For the main terms used in this Standard, the definitions in **JIS H 0400** apply, and the rest of the terms shall be as follows.

- a) **significant surface** A surface of a product coated or to be coated and for which the coating is essential for its main performance and appearance.

Informative reference: The contents of **JIS H 0400** are equivalent to **ISO 2080 : 1981** *Electroplating and related processes—Vocabulary*.

4 Symbols For the symbol of electroplated coatings, the symbol E indicating engineering purposes shall be prefixed to the chemical element symbol Ag of electroplated coatings of silver with a hyphen “—” between them, and others shall be in accordance with **JIS H 0404**.

5 Qualities

5.1 Appearance of electroplated coatings The appearance of electroplated coatings shall be tested in accordance with **10.2**, and the significant surface of electroplated coatings shall be free from failures of gloss, brightness, hue, etc., defects of electroplated coatings such as rough surface, burnt deposits, cracks, pits, development of dendrite at an edge part, exposure of basis material or electroplated undercoatings, etc., symptoms of inferiority in adhesion such as blisters, peeling, or stains, flaws, etc.

Remarks 1 When the degree of brightness, etc. is specified, the appearance shall be as agreed upon between the purchaser and the supplier.

- 2 When it is unavoidable to provide a current contact on the significant surface, its position shall be subjected to the agreement between the purchaser and the supplier.

5.2 Thickness of electroplated coatings The thickness of electroplated coatings shall be specified as agreed upon between the purchaser and the supplier. The thickness test shall be conducted in accordance with **10.3**, and the result shall conform to the specified thickness of electroplated coatings at any position on the significant surface.

Informative reference : The classification of the minimum thickness of electroplated coatings which is generally used shall be as given in Informative reference Table 1.

Informative reference Table 1 Classification of the minimum thickness of electroplated coatings

Unit : μm

Minimum thickness of electroplated coatings
0.5, 1.0, 3.0, 5.0, 10.0, 20.0, 50.0, 100.0

5.3 Silver content of electroplated coatings When the silver content of electroplated coatings is specified, carry out the test in accordance with 10.4, and the result shall satisfy the specified value.

5.4 Degree of porosity of electroplated coatings When the degree of porosity of electroplated coatings is specified, carry out the test in accordance with 10.5, and the result shall satisfy the specified value.

5.5 Anti-tarnishing of electroplated coatings When the anti-tarnishing is specified to the electroplated coatings which have been processed with tarnish-proof treatment after electroplating, carry out the test in accordance with 10.6, and the result shall satisfy the specified value.

5.6 Corrosion resistance of electroplated coatings When the corrosion resistance of the electroplated coatings is specified, carry out the test in accordance with 10.7, and the result shall satisfy the specified value.

5.7 Adhesion of electroplated coatings The adhesion of electroplated coatings shall be tested in accordance with 10.8, and the electroplated coatings shall be free from inferiority in adhesion such as peeling, blisters, etc. and its symptoms.

Further, when the electroplated coatings are free from peeling and the basis material is ruptured by crack in a bending test, it is not taken as inferiority in adhesion of electroplated coatings.

5.8 Solder wetting of electroplated coatings When the solder wetting of electroplated coatings is specified, the electroplated coatings shall be tested in accordance with 10.9, the dipped part shall be wetted uniformly, and the soldered surface shall be flat and free from any nodule.

The quality to be tested by other testing methods shall be as agreed upon between the purchaser and the supplier.

Remarks : After the solder wetting test of electroplated coatings, the bending test of the adhesion test in 10.8 is carried out, and there shall be neither scaly scatterings nor peeling off of the soldered part.

5.9 Residual salts on the significant surface of electroplated coatings When stains by electroplating solution component salt remaining on the significant surface of electroplated coatings come into question and it is specified that the amount of this residual salt is examined, the electroplated coatings shall be tested in accordance with 10.10, and the amount of the residual salt shall conform to the specified value.

5.10 Electrical properties of electroplated coatings When the electrical properties of electroplated coatings are specified, the electroplated coatings shall be tested in accordance with 10.11, and the electrical properties shall conform to the specified values.

5.11 Hardness of electroplated coatings When the hardness of electroplated coatings is specified, the electroplated coatings shall be tested in accordance with 10.12, and the hardness shall conform to the specified value.

5.12 Wear resistance of electroplated coatings When the wear resistance of electroplated coating is specified, the electroplated coating shall be tested in accordance with 10.13, and the wear resistance shall conform to the specified value.

5.13 Ductility of electroplated coatings When the ductility of electroplated coatings is specified, the electroplated coatings shall be tested in accordance with 10.14, and the ductility shall conform to the specified value.

6 Basis material Since the state of basis material before electroplating has a serious influence on the quality of electroplated coatings, especially when materials for basis material are supplied from a purchaser, the purchaser shall state information concerning the materials for basis material on the specification sheet for processing or the like.

7 Electroplated undercoatings When electroplated undercoating is performed in order to improve the appearance, corrosion resistance, adhesion, etc. of electroplated coatings, the kind and thickness of the electroplated coatings shall be as agreed upon between the purchaser and the supplier.

Further, the kind and the minimum thickness of electroplated undercoatings which have been stated as informative reference in the corresponding International Standard are given in Annex 3 (informative).

8 Stress relief before electroplating of materials for iron and steel basis material When stress relief before electroplating of the materials for iron and steel basis material is specified, the stress relief is performed by heat treatment. Conditions for the heat treatment shall be as agreed upon between the purchaser and the supplier.

Further, heat treatment conditions for stress relief before electroplating which have been stated as informative reference in the corresponding International Standard are given in Annex 4 (informative).

9 Hydrogen embrittlement relief after electroplating of electroplated iron and steel basis material parts When execution of hydrogen embrittlement after electroplating is specified for electroplated coatings on iron and steel basis material, hydrogen embrittlement relief shall be performed by heat treatment within 4 h after electroplating. Conditions for the heat treatment shall be as agreed upon between the purchaser and the supplier.

Further, heat treatment conditions for hydrogen embrittlement relief after electroplating which have been stated as informative reference in the corresponding International Standard are given in Annex 5 (informative).

10 Test methods

10.1 Preparation of test piece A test piece shall be, as a rule, prepared from a product. However, when an electroplated product itself can not be used as the test piece, the test may be carried out with a substitute test piece.

For preparation of the substitute test piece, basis material of the same quality as that of the electroplated part shall be used, and the preparation shall be executed under the same electroplating conditions as much as possible.