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IS : 8929 - 1978

*Indian Standard*  
SPECIFICATION FOR  
HIGH PURITY GOLD WIRE FOR  
ELECTRICAL CONTACTS

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# Indian Standard

## SPECIFICATION FOR HIGH PURITY GOLD WIRE FOR ELECTRICAL CONTACTS

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*Indian Standard*  
SPECIFICATION FOR  
HIGH PURITY GOLD WIRE FOR  
ELECTRICAL CONTACTS

**0. FOREWORD**

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 18 September 1978, after the draft finalized by the Precious Metals Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** High purity gold wire is used in various types of contacts for low and medium energy circuits in semi-conductor devices. Need was felt for a standard which should lay down its chemical composition and physical requirements so that it may serve as suitable material for electrical contacts.

**0.3** 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.

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**1. SCOPE**

**1.1** This standard specifies requirements for high purity gold wire used for electrical contacts.

**2. SUPPLY OF MATERIAL**

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

**2.2** The material shall be supplied either in annealed or in hard condition.

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\*Rules for rounding off numerical values (*revised*).

†General requirements for the supply of metallurgical materials (*first revision*).

### 3. CHEMICAL COMPOSITION

3.1 The purity of gold shall be 99.99 percent minimum and the impurities shall not exceed the limits as specified below:

	<i>Percent</i>
Copper, <i>Max</i>	0.009
Silver, <i>Max</i>	0.009
Any other metallic impurities, such as bismuth, <i>Max</i>	0.003
Total of all metallic impurities including silver and copper, <i>Max</i>	0.010

NOTE — The impurities shall be determined by any method agreed to between the supplier and purchaser, till an Indian Standard on the subject is available.

### 4. FREEDOM FROM DEFECTS

4.1 The surface of wire shall be clean and free from lubricants, oils, dirt when viewed under 30× magnification.

### 5. DIMENSIONS

5.1 The wire shall have the following dimensions. If required, the wire may be annealed suitably before the measurement of dimensions:

<i>Diameter</i> mm	<i>Tolerance</i> mm
0.013	± 0.001
0.020	± 0.001
0.023	± 0.001
0.03	± 0.002
0.05	± 0.002
0.08	± 0.003
0.13	± 0.004

5.2 For measuring the average diameter, the method given in 5.2.1 to 5.2.1.3 shall be employed.

5.2.1 *Procedure* — Select a test specimen at least 1 m from the end of a spool or sufficiently far from either end to be free from bends, kinks or other damage resulting in lack of straightness of the cut length. The wire shall be drawn from the spool under a low even tension so that no elongation of the wire takes place.



**5.2.1.1** Cut each test specimen to a length of  $200 \pm 0.1$  mm. To prevent stretching, care shall be taken so that the tension is just sufficient to eliminate the sag and curl.

**5.2.1.2** Fold the test specimen upon itself several times and twist to make a compact bundle with a loop consisting of single strand for hanging it on the balance beam. In case the specimens are more than one, they shall be twisted together and hung by a loop consisting of a single strand. The specimen shall be handled as little as possible and the operators hands shall be cleaned and dried.

**5.2.1.3** Weigh in a micro-balance capable of reading up to  $0.0002$  mg with an accuracy of  $0.004$  mg. Handle and use the balance as recommended by the manufacturer. Report average weight of the wire to three significant figures in mg/200 mm.

### 5.2.2 Calculation

$$\text{Diameter, mm} = \sqrt{\frac{M}{1.90}} \times 0.025$$

where

$M$  = mass in mg of 200 mm of wire.

NOTE — Density of gold is taken as  $19.34$  g/cm<sup>3</sup>.

## 6. TENSILE PROPERTIES

**6.1** The wire in annealed and hard condition shall meet the requirements given in Tables 1 and 2 respectively when tested by methods given in **6.2** and **6.3**.

**TABLE 1 ELONGATION AND BREAKING LOAD FOR ANNEALED WIRE**

DIAMETER mm	ELONGATION PERCENT ON GAUGE LENGTH OF 200 mm	BREAKING LOAD, g <i>Min</i>
(1)	(2)	(3)
0.013	1.0-3.0	1
0.020	1.0-8.0	3
0.023	1.0-8.0	4
0.03	1.0-12.0	5
0.05	2.0-20.0	20
0.08	4.0-25.0	45
0.13	5.0-25.0	120

TABLE 2 ELONGATION AND BREAKING LOAD FOR HARD WIRE

( Clause 6.1 )

DIAMETER mm	ELONGATION PERCENT ON GAUGE LENGTH OF 200 mm	BREAKING LOAD, g Min
(1)	(2)	(3)
0.013	0.5-1.5	3
0.020	0.5-2.0	8
0.023	0.5-2.0	13
0.03	0.5-2.5	17
0.05	0.5-3.0	70
0.08	0.5-3.0	150
0.13	0.5-4.0	420

**6.2 Procedure for Testing Tensile Properties** — Cut a test piece which shall be 250 mm. Mark on the test piece, gauge length of 200 mm with an accuracy of  $\pm 0.25$  mm. The test piece shall be straight before it is marked and marking shall be done by fine scribed lines taking care not to cause fracture at the gauge marks. Hold the test piece between the screwed holders in such a way that the load is applied axially. Increase the load as uniformly as possible and measure the maximum load which it can withstand during the test.

**6.3 Elongation** — Put the fractured parts of the test piece carefully as to fit together, so that they lie in a straight line. Measure the increase in the length of the gauge length and calculate the percentage elongation.

## 7. SAMPLING

**7.1 Lot** — A lot shall consist of all the material from one melt or bar supplied against a single order.

**7.2** Select one percent of spools, but not less than two from each lot. Take specimen sufficiently far from either end of spool of wire to be free of kinks, bends or distortion.

## 8. PACKING

**8.1** The material may be spooled on aluminium spools and should be wound in such a way that it despoils freely. It should be free of any kinks. A specimen of a spool with typical dimensions is given in Appendix A for information.

## 9. MARKING

**9.1** The material shall be marked with the name or trade-mark of the manufacturer, purity of gold, diameter of wire and weight of the contents of the package.

**9.1.1** The material may also be marked with the ISI Certification Mark.

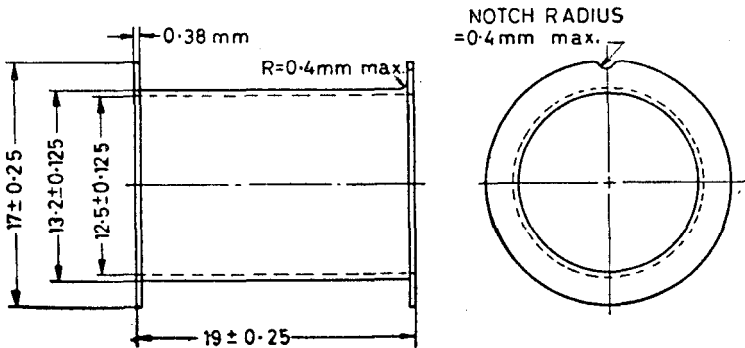
**NOTE** — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply 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.

## APPENDIX A

( Clause 8.1 )

### SPECIMEN OF SPOOL

**A-1.** A sketch of spool with typical dimensions is given in Fig. 1 for information.



All dimensions in millimetres.

FIG. 1 SKETCH OF THE SPOOL

# INDIAN STANDARDS

ON

GOLD

IS:

- 639-1965 Gold leaf (*revised*)
- 1417-1971 Grades of gold and gold alloys (*first revision*)
- 2790-1964 14, 12 and 9 carat gold
- 3095-1965 Solders for use in goldwares
- 3541-1966 Code of practice for manufacture of 14 and lower carat gold alloys
- 3571-1966 Dental gold solders
- 3578-1966 Dental gold alloy wire
- 3610-1966 Dental gold foil
- 4799-1968 Dental casting gold alloys
- 5954-1970 Dental white gold alloys
- 7562-1974 Gold cladding
- 8844-1978 Guidelines for marking purity of gold on gold articles/ornaments