

आभूषण बनाने में प्रयुक्त स्वर्ण

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पुनरीक्षण )

Gold Solders For for Use In in  
Manufacture Of of Jewellery —  
Specification

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Revision )

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ICS 39.060

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**September ~~August~~ 2024**  
**Price Group**

Precious Metals Sectional Committee, MTD 10

## FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Precious Metals Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was ~~first earlier~~ published in 1965 and subsequently revised in 1981 and 1999. This revision has been brought out to bring the standard in the latest style and format of the Indian Standards. In addition, following significant changes have been made:

- Scope of the standard has been revised in line with the grades of gold jewellery/artefacts specified in IS 1417 : 2016;
- Clause 3, for terminology has been inserted after the 'reference' clause;
- Clause 4 has been revised in line with the revision made in the scope;
- Tables 1 and 2 have been merged into a single Table 1; and
- ~~Table 3~~ Table 3 has been modified and renumbered as Table 2.

In formulation of this standard, assistance has been derived from International Standard ISO 22764 : 2020 'Jewellery and precious ~~Metals~~metals — Fineness of solders used with precious metal jewellery alloys' issued by International Organization for Standardization.

The composition of the ~~C~~committee responsible for the formulation of this standard is given in Annex A.

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 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*  
**GOLD SOLDERS FOR USE IN MANUFACTURE OF  
JEWELLERY — SPECIFICATION**  
*(Third Revision)*

## 1 SCOPE

This standard lays down the requirements for gold solders for use in the manufacture of gold jewellery artefacts of 24 carat, 23 carat, 22 carat, 20 carat, 18 carat and 14 carat.

## 2 REFERENCE

The following standard contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard:

<i>IS No.</i>	<i>Title</i>
IS 1417 : 2016	Gold and gold alloys, jewellery/artefacts — Fineness and marking — Specification ( <i>fourth revision</i> )

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## 3 TERMINOLOGY

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

**3.1 Carat** — The ratio between the mass of gold content and the total mass expressed in parts per twenty four.

**3.2 Fineness** — The ratio between the mass of gold content and the total mass expressed in parts per thousand (‰).

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**3.3 Gold** — The metallic element gold free from any other element.

**3.4 Gold Alloy** — Gold alloyed with one or more other elements.

**3.5 Gold Solder** — Gold alloy used to join parts of gold metal/alloy.

## 4 GRADES

The cadmium free yellow and white gold solders shall be of the following grades in carat:

<i>Sl No.</i>	<i>Cadmium Free Yellow Gold Solders</i>	<i>Cadmium Free White Gold Solders</i>
(1)	(2)	(3)
i)	22	20
ii)	20	18
iii)	18	14
iv)		

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**NOTE** — For articles/ornaments of 24 carat and 23 carat, solder of grade 22 may be used, provided the skin purity of 24 carat and 23 carat gold alloy is kept slightly on higher side so that the melting purity conforms to the declared quality/grade.

## 5 FORM

The solders used shall preferably be in form of paste. However other forms like sheet, wire, strip, snippet etc may also be used subject to condition that the final purity of the jewellery is as declared and conforms to the prescribed grades.

## 6 MANUFACTURE

Gold solders shall be made from standard gold of fineness 995 or above as prescribed in IS 1417 and silver and base metal of minimum fineness of 999 parts per thousand (‰) and free from other harmful elements. The base metal content may vary to get desired colour and other physical characteristics but the gold content shall remain unchanged as per the respective grades as per 4.1 of IS 1417.

## 7 TYPICAL CHEMICAL COMPOSITIONS

Typical chemical compositions of various grades of gold solders are given in Tables 1 and 2.

## 8 PACKING

The material shall be suitably packed to avoid any damage during transport.

## 9 MARKING

9.1 The package or the container of the solder shall be marked as below:

- Manufacturer's name and identification mark;
- Batch number; and
- Grade and purity.

### 9.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

**Table 1 Typical Chemical Composition of Cadmium Free Yellow Gold Solders**

(Foreword Clause 6)

SI No.	Grades in Carat	Metals, Present By Mass						Meeting Range <sup>1)</sup> °C	
		Au	Ag	Cu	Zn	In	Ga	(9)	(10)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	14 Easy	58.33	13.34	15.00	8.75	4.58	-	669	741
ii)	Medium	58.33	14.50	14.25	9.17	3.75	-	660	745
iii)	Hard	58.33	14.16	14.58	10.00	2.93	-	668	748
iv)	Easy	58.33	18.00	15.47	5.00	3.00	-	720	760
v)	Medium	58.33	21.00	16.97	2.00	1.50	-	750	620
vi)	Hard	58.33	22.47	17.00	2.00	-	-	800	620
vii)	18 Easy	75.00	6.25	8.50	5.50	4.75	-	730	765
viii)	Medium	75.00	5.75	9.50	6.00	3.75	-	682	767
ix)	Hard	75.00	5.25	12.25	6.50	1.00	-	792	829

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Sl No.	Grades in Carat	Metals, Present By Mass						Meeting Range <sup>1)</sup> °C	
		Au	Ag	Cu	Zn	In	Ga	(9)	(10)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
x)	Easy	75.20	5.80	11.00	5.00	3.00	-	700	740
xi)	Medium	75.20	6.90	13.10	2.80	2.00	-	750	770
xii)	Hard	75.20	8.80	13.20	1.80	1.00	-	820	840
xiii)	20 <del>20</del>	83.5	4.12	5.61	3.63	3.14	-	-	-
xiv)	22 <del>22</del> Easy	91.80	2.40	2.00	1.00	2.80	-	850	895
xv)	Medium	91.80	3.00	2.60	1.00	1.60	-	900	925
xvi)	Hard	91.80	4.20	3.00	1.00	-	-	940	960
xvii)	Very Easy	91.75	-	-	1.65	4.13	2.47	-	-

Table 2 Typical Chemical Composition of Cadmium Free White Gold Solders

(Foreword Clause 6)

Sl No.	Grades in Carat	Metals, Present By Mass						Meeting Range <sup>1)</sup> °C	
		Au	Ag	Cu	Ni	Zn	In	Solidus Temperature	Liquidus Temperature
(1)	(2)	(3)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	14 Easy	58.33	22.0	4.42	1.25	12.0	2.0	695	716
ii)	Hard	58.33	26.0	3.67	3.00	9.0	-	755	805
iii)	Easy	58.33	15.75	5.00	5.00	15.92	-	707	729
iv)	Hard	58.33	15.75	11.00	5.00	9.92	-	800	833
v)	18 Easy	75.00	-	6.0	5.50	13.50	-	802	826
vi)	Hard	75.00	-	9.0	9.0	7.00	-	843	870
vii)	Easy	75.00	-	6.50	12.00	6.50	-	803	834
viii)	Hard	75.00	-	1.00	16.50	7.50	-	888	902
ix)	20	83.0	-	-	10.0	6.7	-	855	885

NOTE — Composition of cadmium free gold solders given in Tables 1 and 2 are indicative and not exhaustive. The base metal contents may vary to get desired colour and other physical characteristics, but gold content shall remain unchanged as per respective grades as per 3.1.

<sup>1)</sup> Melting ranges are given for guidance only. Solidus is the temperature at which the solder starts melting and liquidus is the temperature at which the solder is completely liquid.

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**ANNEX A**

(Foreword)

**COMMITTEE COMPOSITION**

Precious Metals Sectional Committee, MTD 10

<i>Organization</i>	<i>Representative(s)</i>	Formatted Table
Geological Survey of India, New Delhi	SHRI PARAVJEET SINGH ( <i>Chairperson</i> )	Formatted
All India Gems and Jewellery Trade Federation, Mumbai	SHRI D. D. KAREL	Formatted
	SHRI SURESH I. DHYRUV ( <i>Alternate</i> )	Formatted
	SHRI ANIL C. KANSARA ( <i>Alternate</i> )	Formatted
Association of Gold Refineries and Mints, New Delhi	SHRI ANIL C. KANSARA ( <i>Alternate</i> )	Formatted
Bhartiya Swarnkar Sangh, Jaipur	SHRI DULI CHAND KAREL	Formatted
	SHRI PREM KUMAR SONI ( <i>Alternate</i> )	Formatted
CGR Metalloys Private Limited, Kochi	SHRI JAMES JOSE	Formatted
	SHRI JOSEPH K. JAMES ( <i>Alternate</i> )	Formatted
CSIR - National Physical Laboratory, New Delhi	DR N. VIJAYAN	Formatted
CSIR - Indian Institute of Toxicology Research, Lucknow	SHRI R. C. MURTHY	Formatted
CSIR - National Metallurgical Laboratory, Jamshedpur	DR K. K. SAHU	Formatted
	DR ASHOK K. MOHANTY ( <i>Alternate</i> )	Formatted
Consumer Education and Research Centre, Ahmedabad	DR C. J. SHISHOO	Formatted
Consumer Guidance Society of India, Mumbai	DR SITARAM DEWIT	Formatted
	DR M. S. KRAMATH ( <i>Alternate</i> )	Formatted
Gem and Jewellery Export Promotion Council, Mumbai	SHRI Sabyasachi Ray	Formatted
Gujarat Gold Centre, Ahmedabad	SHRI SHARAD C. KANSARA ( <i>Alternate</i> )	Formatted
Hindalco Industries Limited, Mumbai	SHRI JAYESH PAWAR	Formatted
	SHRI DIVYANG SHAH ( <i>Alternate</i> )	Formatted
India Government Mint, Mumbai	SHRI BIMAL PARSAD	Formatted
	SHRI RAVINDRA GUNDERAO JADHAV ( <i>Alternate</i> )	Formatted
	SHRI HARSHAD AJMERA	Formatted

Indian Association of Hallmarking Centres,  
New Delhi

SHRI- UDAY SHINDE (Alternate)

Indian Diamond Institute, Surat

SHRI SAMIR D. JOSHI

SHRI HITESH VERMA (Alternate)

Indian Institute of Technology Bombay, Mumbai

SHRI SMRUTIRANJAN PARIDA

SHRI N. K. KHOSLA (Alternate)

Institute of Chemical Technology, Mumbai

DR B. M. BHANAGE

SHRI RADHE V. JAYARAM (Alternate)

Jalan and Company, Chandni Chowk, New Delhi

SHRI ISHWAR. JALAN

SHRI VINAY JALAN (Alternate)

MMTC\_-PAMP India Private Limited, New Delhi

SHRI PANKAJ DESHMUKH

SHRI ANKUR- GOYAL (Alternate)

National Centre for Compositional Characterization  
of Materials, New Delhi

DR R. SHEKAR

SHRI N. N. MEERVALE (Alternate)

National Chemical Laboratory, Pune

SHRI C. S.- GOPINATH

DR- E. BALARAMAN (Alternate)

National Mineral Development Corporation,  
Hyderabad

DR- CH SARVAN KUMAR

DR- K. SRIRAMGURU (Alternate)

National Refinery Private Limited, Mumbai

SHRI ASHISH SONEWALA

SHRI AMIT J. (Alternate)

National Test House, Kolkata

DR A. B. MONDAL (Alternate)

Sigma Four, New Delhi

SHRI A. K. BAHL

SHRIMATI ANITA BHATIA- (Alternate)

Titan Company Limited, Bangalore

SHRIMATI MEENAKSHI SUNDARAM

SHRI ANIKESH NANDY- (Alternate)

Voluntary Organisation in Interest of Consumer  
Education (VOICE), New Delhi

SHRI B. K. MUKHOPADHYAY

SHRI M. A. U. KHAN (Alternate)

World Gold Council, New Delhi

SHRI P. R. SOMASUNDARAM

BIS Directorate General

SHRI SANJIV MAINI, SCIENTIST 'F' / ~~AND SENIOR DIRECTOR~~ AND  
HEAD (METALLURGICAL ENGINEERING) [REPRESENTING DIRECTOR  
GENERAL (Ex-officio)]

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SHRI KUNAL KUMAR  
SCIENTIST 'E' / DIRECTOR  
(METALLURGICAL ENGINEERING), BIS