भारतीय मानक
Indian Standard

IS 17278 : 2019

उन्नत वितरण हेतु परिष्कृत सोने एवं चाँदी की सलाखें — विशिष्टि

Refined Gold and Silver Bars for Good Delivery — Specification

ICS 39.060

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

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Precious Metals Sectional Committee, MTD 10

FOREWORD

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

Good delivery working system is a controlled working system surrounding the global trade of gold and silver bars. Refiners of gold and silver bars are assessed and certified based on their capability to produce gold and silver bars for good delivery as per the specified guidelines set out by the certifying agencies.

This standard prescribes the technical requirements, such as fineness, shape, size, etc. of the refined gold and silver bars for good delivery by the refiners and is a part of the guidelines of good delivery working system. The refiners have to produce the refined gold and silver bars according to this specification and as per the guidelines issued by the certifying agencies that certifies these refineries. The bars meeting to the requirements of this standard will have acceptance by all the stakeholders in the global trade of gold and silver bars.

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

REFINED GOLD AND SILVER BARS FOR GOOD DELIVERY — SPECIFICATION

1 SCOPE

1.1 This standard specifies the technical requirements of refined gold and silver bars for good delivery by refiners.

1.2 The bars shall be produced by the refiners as per the guidelines laid down by the certifying agency.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were 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 editions of the standard indicated below:

IS No.	*Title*
1418 : 2009	Determination of gold in gold bullion, gold alloys and gold jewellery/artefacts — Cupellation (fire assay) method (*third revision*)
2113 : 2014	Assaying silver in silver and silver alloys — Methods (*third revision*)
16901 : 2019 /ISO 15093 : 2015	Jewellery — Determination of precious metals in 999‰ gold, platinum and palladium jewellery alloys — Difference method using ICP — OES
16900 : 2019 /ISO 15096 : 2014	Jewellery — Determination of silver in 999‰ silver jewellery alloys — Difference method using ICP — OES

3 TERMINOLOGY

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

3.1 Assaying — Method of accurate determination of the gold or silver content of the sample, expressed in parts per thousand (‰).

3.2 Fineness — Ratio between the mass of gold or silver content and the total mass expressed in parts per thousand (‰).

3.3 Standard Gold — Gold having fineness 995 parts per thousand (‰) and above.

3.4 Fine Gold — It is gold having fineness 999 parts per thousand (‰) and above.

3.5 Fine Silver — It is silver having fineness 999 parts per thousand (‰) and above.

3.6 Undercut — The undercut refers to the degree of slope on the side and ends of the bar and is represented by the angle of deviation from the vertical of the side and end surfaces.

3.7 Certifying Agency — The certifying agency is the agency appointed by competent authority for certifying the gold and silver refineries for their capability to produce refined gold and silver bars as per the guidelines specified by it for good delivery of refined gold and silver bars.

3.8 Refined Gold Bar — Refined gold casted in the form of a rectangular parallelepiped and manufactured in a refinery.

3.9 Refined Silver Bar — Refined silver casted in the shape of an ingot having trapezoidal cross section, both along the length and across the width of the bar and manufactured in a refinery.

4 GRADES OF REFINED GOLD AND SILVER BARS FOR GOOD DELIVERY

4.1 Refined gold bars for good delivery shall be of fineness of 995.0 ppt or above. No negative tolerance shall be allowed on the declared gold content.

4.2 Refined silver bars for good delivery shall be of fineness of 999.0 ppt or above. No negative tolerance shall be allowed on the declared silver content.

5 MANUFACTURE

5.1 The refined gold bars shall be made from gold refined either by aquaregia process or by electrolysis process of refining.

5.2 The refined silver bars shall be made from silver refined by electrolysis process of refining.

5.3 Bars shall be produced in moulds of graphite or cast iron, either by the conventional method of pouring molten metal into them or alternatively, by melting grain in an induction tunnel system.

5.4 Bars cast in open moulds shall be produced in a single pouring.

5.5 Bars must be easy and safe to handle. Proper stacking and handling of a bar will be taken into consideration during bar inspections.

5.6 The edges of the bars must not be sharp, so as to avoid the risk of injury during handling.

5.7 Refined gold and silver bars for good delivery shall only be produced by the refiners, certified for the purpose by the certifying agency, and the bars have to be manufactured as per the guidelines laid down by the certifying agency.

6 DIMENSIONS AND WEIGHTS

6.1 The standard refined gold bars for good delivery shall be casted by the refiner as per the dimensions and weights as given in **8.1**.

6.2 The standard refined silver bars for good delivery shall be casted by the refiner as per the dimensions and weights as given in **8.2**. The silver bars shall have sufficient undercut to facilitate handling but without resulting in the width of the bottom surface being so narrow that the bar cannot be safely stacked.

6.3 Refined gold for good delivery may also be supplied by the refiner with the weights other than the standard weight specified in **8.1** with prior approval from certifying agency, subject to a minimum of 100 gms weight of each bar. The shape of the bars shall be as per the diagram shown in Annex A in case of refined gold bar and Annex B in case of refined silver bars. The dimensions of the bars shall be proportionately increased or decreased from the dimensions as shown in the diagrams of Annex A and Annex B based on the weights of the bars. Prior approval of the drawings of bars of these weights shall be taken by the refiner from the certifying agency.

7 FREEDOM FROM DEFECTS

7.1 Bars must be of good appearance.

7.2 Faults that must be avoided, especially on the top surface of the bars, are:

a) Irregularities, such as surface cavities, cracks, holes or blisters; and

b) Excessive shrinkage that is, the concavity of the top face of the bar and any concentric cooling rings must not be such that it makes it difficult to either apply or read the bar marks, or in the case of convexity bars become unstable when stacked on top of each other.

7.3 The sides and bottom (smaller) surface should be flat and reasonably smooth (which does not imply the need for a mirror-like finish) and free from cavities, lumps and excessive layering. Layering is considered to be excessive if it can result in dust or dirt being trapped and thus affecting the recorded weight of a bar.

7.4 The bars shall be free from internal defects, such as blow holes, cavities, hidden objects, etc. The refiner shall ensure that the gold and silver bars produced by it for good delivery, are free from above internal defects.

7.5 In case of gold bars, hammering is not acceptable, as are any attempts to conceal defects that is, burnishing. In some cases the use of a ball pen hammer to flatten a sharp protrusion may be considered acceptable. In the case of silver bars, it is recognised that a small degree of hammering or other surface treatment is sometimes required but such hammering should not affect the markings or shape of the bar.

8 PHYSICAL SPECIFICATIONS FOR STANDARD REFINED GOLD BARS FOR GOOD DELIVERY

8.1 The weight and the dimensional range for the standard refined gold bars for good delivery shall be as given below**:**

Standard Refined Gold Bar for Good Delivery	
Weight	1 000 gms/1 kg
Tolerance in weight	-0/+0.5 gms
Dimensions	
Length (Top)	113 mm to 117 mm
Width (Top)	51 mm to 55 mm
Height	6.5 mm to 10.5 mm
Weight marks	" 1 kg gold or 1 000 g gold" to be stamped prominently on the top face of the bar

Drawing	given at Annex A
Edge radius	as specified in the drawing
Markings	Identification of the refiner
	Fineness (to four significant figures)
	The text "1 kg gold or 1 000 g gold" stamped prominently on the top face of the bar
	Serial number (*see* **12.5**)
	Year of manufacture
Certificate of purity	Shall be issued by authorized signatory of the refinery for each bar mentioning purity, weight, serial number and details of refinery

8.2 The weight and the dimensional range for the standard refined silver bars for good delivery shall be as given below**:**

Standard Refined Silver Bar for Good Delivery	
Weight (Gross)	Minimum weight: 14 kg, maximum weight: 16 kg.
Tolerance in weight	No negative tolerance on the declared weight.
Dimensions	
Length (Top)	310 mm ± 5 mm
	Undercut: 5º to 15º
Width (Top)	120 mm ± 5 mm
	Undercut: 5º to 15º
Height	44 mm ± 5 mm
Weight marks	Gross weight of a bar shall be expressed in kg in multiples of 1 gm, rounded down to the nearest 1 gm.
Drawing	given at Annex B
Edge radius	as specified in the drawing
Markings	Identification of the refiner Fineness, expressed to either three or four significant figures
	Serial number (*see* **12.5**)
	Year of manufacture
Certificate of purity	Shall be issued by authorized signatory of the refinery for each bar mentioning purity, weight, serial number and details of refinery

8.3 Approval of the Bar Dimensions and its Markings

a) The refiner shall submit the technical drawing of the bars giving the dimensions and marks on the bars to the certifying agency. The fully dimensioned, black and white scale technical drawing on A4 size paper showing the location of the marks and a detailed view of the marks shall be submitted to the certifying agency. The drawing should include the height of the characters used for the serial number and other marks.

b) Once the drawing has been approved and the bar has gone into production, the refiner must send electronic images of the bar in plan and perspective views to the certifying agency (*see* Annex A and Annex B for a description of the required drawing).

8.4 Changes to Bar Dimensions or Marks

a) The refiner intending to change either the bar dimensions or the marks on the bars shall submit a technical drawing of the proposed new bar to the certifying agency. However, if a refiner wishes to change either the dimensions or marks on the bars, it must ensure that the new bars have dimensions within the ranges specified initially.

b) On approval of the drawing, the bar may be sent into production and the refiner shall submit electronic images of the new bar in plan and perspective views to the certifying agency.

9 WEIGHT

9.1 Weight of refined gold and silver bars shall be as declared by refiner in metric units as per specifications given above.

9.2 No negative tolerance shall be permitted on the declared or marked weight.

9.3 Weight may not be marked on bars of silver, because bars may be weighed on delivery, and this weight which may be different from that originally marked will prevail. A bar's weight may also change by handling or sampling, thus invalidating the original mark.

9.4 Bars shall be weighed on an electronic balance, which shall comply with the criteria given at Annex C.

10 ASSAYING

10.1 Determination of gold content in the refined gold bar shall be done in accordance with IS 1418 and as per the sampling plan specified by the certifying agency. The refiner can also carry out the assaying for the determination of the gold content in the refined gold bar in accordance with IS 16901/ISO 15093. In such case,

all residual elements in the gold bars shall be identified by the refiner and those are to be analyzed by the spectrographic method. In case assaying is done as per IS 16901/ISO 15093, then the indicative list of residual elements to be analyzed in the gold bars is as given in Table 1. In both the above methods of assaying, the refiner is responsible to ensure that the gold content in the bars shall be as per the fineness marked on the bars. In case of dispute, the procedure of determination of gold content in the refined gold bar given in IS 1418 shall be the referee method.

Table 1 Assaying

(*Clauses* 10.1, 10.2 *and* 10.3)

Sl No.	Residual Elements	Gold	Silver
(1)	(2)	(3)	(4)
i)	Gold (Au)		x
ii)	Silver (Ag)	x	
iii)	Platinum (Pt)	x	x
iv)	Palladium (Pd)	x	x
v)	Rhodium (Rh)	x	
vi)	Iridium (Ir)	x	
vii)	Ruthenium (Ru)	x	
viii)	Osmium (Os)	x	
ix)	Aluminium (Al)	x	x
x)	Arsenic (As)	x	x
xi)	Bismuth (Bi)	x	x
xii)	Calcium (Ca)	x	x
xiii)	Cadmium (Cd)	x	x
xiv)	Cobalt (Co)	x	x
xv)	Chromium (Cr)	x	x
xvi)	Copper (Cu)	x	x
xvii)	Iron (Fe)	x	x
xviii)	Indium (In)		x
xix)	Magnesium (Mg)	x	x
xx)	Manganese (Mn)	x	x
xxi)	Lead (Pb)	x	x
xxii)	Nickel (Ni)	x	x
xxiii)	Antimony (Sb)	x	x
xxiv)	Selenium (Se)	x	x
xxv)	Silicon (Si)	x	x
xxvi)	Tin (Sn)	x	x
xxvii)	Tellurium (Te)	x	x
xxviii)	Titanium (Ti)	x	x
xxix)	Zinc (Zn)	x	x

10.2 Determination of silver content in the Refined silver bar shall be done in accordance with IS 2113 and as per the sampling plan specified by the certifying agency. The refiner can also carry out the assaying for the determination of the silver content in the refined silver bar in accordance with IS 16900/ISO 15096. In such case, all residual elements in the silver bars shall be identified by the refiner and those are to be analyzed by the spectrographic method. In case assaying is done as per IS 16900/ISO 15096, then the indicative list of residual elements to be analyzed in the silver bars is as given in Table 1. In both the above methods of assaying, the refiner is responsible to ensure that the silver content in the bars shall be as per the fineness marked on the bars. In case of dispute, the procedure of determination of silver content in the refined silver bar given in IS 2113 shall be the referee method.

10.3 The refiners using spectrographic analysis for assaying of their materials are responsible for identifying and analyzing all the residual elements present in their bars. The list shown in Table 1 is not intended to be prescriptive as far as refiners are concerned. It merely indicates the elements that certifying agency will typically look for when analyzing gold and silver samples by spectrographic methods.

10.4 The refiner shall ensure that the presence of residual elements in the gold and silver bars for good delivery shall not have any bearing on the accuracy of assay values of these bars.

10.5 Assaying shall be carried out by qualified and competent personnel. Qualification and competence criteria may be as specified by certifying agency.

11 NON-GOOD DELIVERY BARS

The bars that do not meet the requirements specified in the specification due to inferior appearance or sub-standard marks, then the refiner must stamp those bars with the marking 'NGD' (meaning Non Good Delivery) in close proximity to the approved manufacturer's mark. This may also be true for bars produced in the general form, but due to their intended use (like bars produced for direct delivery to an industrial customer for use as a raw material) they do not meet the specification.

12 MARKING

12.1 Markings on refined gold and silver bars shall be marked by the refiner as given in **8.1** and **8.2** respectively.

12.2 Gold bars shall be marked on the larger side of the two main surfaces (the cast surface at the top of the mould) using conventional (pressure) stamping or dot matrix (pneumatic punching). If pneumatic punching is used, the marks shall be no less clear and at least as durable as if conventional stamping had been used (*see* Annex A).

12.3 Silver bars may alternatively be marked on the end of the bar if marked using a dot matrix method so that the marks can be read from the top edge downwards (*see* Annex B).

12.4 Refiners must apply a consistent font to all digits of the assay mark.

12.5 The marks should include the stamp of the refiner (which, if necessary for clear identification, should include its location), the assay mark (where used), the fineness, the serial number and the year of manufacture as a four digit number.

12.6 Serial number must not comprise of more than eleven digits or characters.

12.7 Marks should be clear and the height of characters used shall be a minimum of 12 mm.

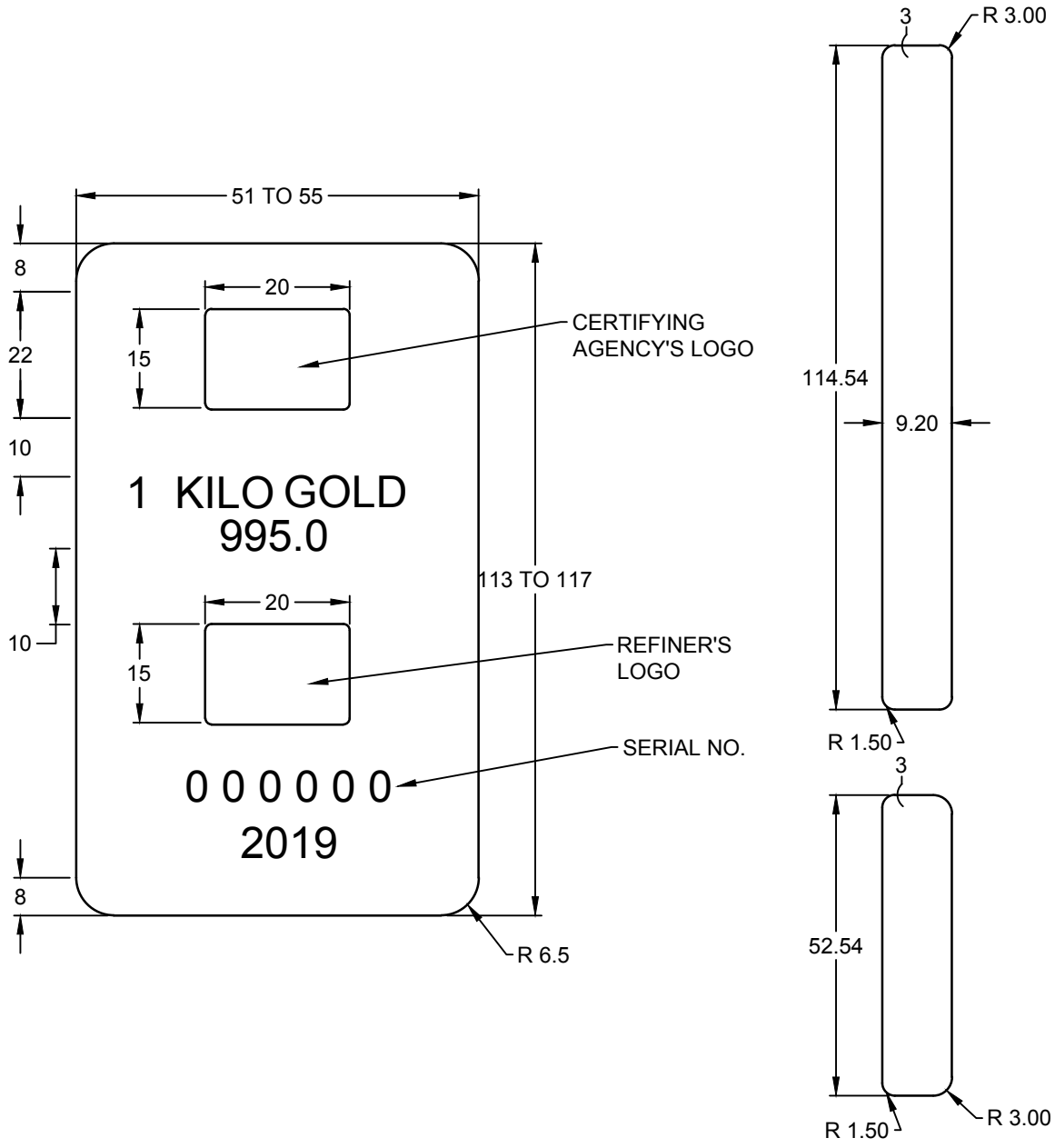
12.8 The unit of weight must be stamped on each bar.

ANNEX A

(*Clauses* 8.3 (b) *and* 12.2)

SPECIMEN TECHNICAL LINE DRAWINGS

A-1 STANDARD REFINED GOLD BAR FOR GOOD DELIVERY



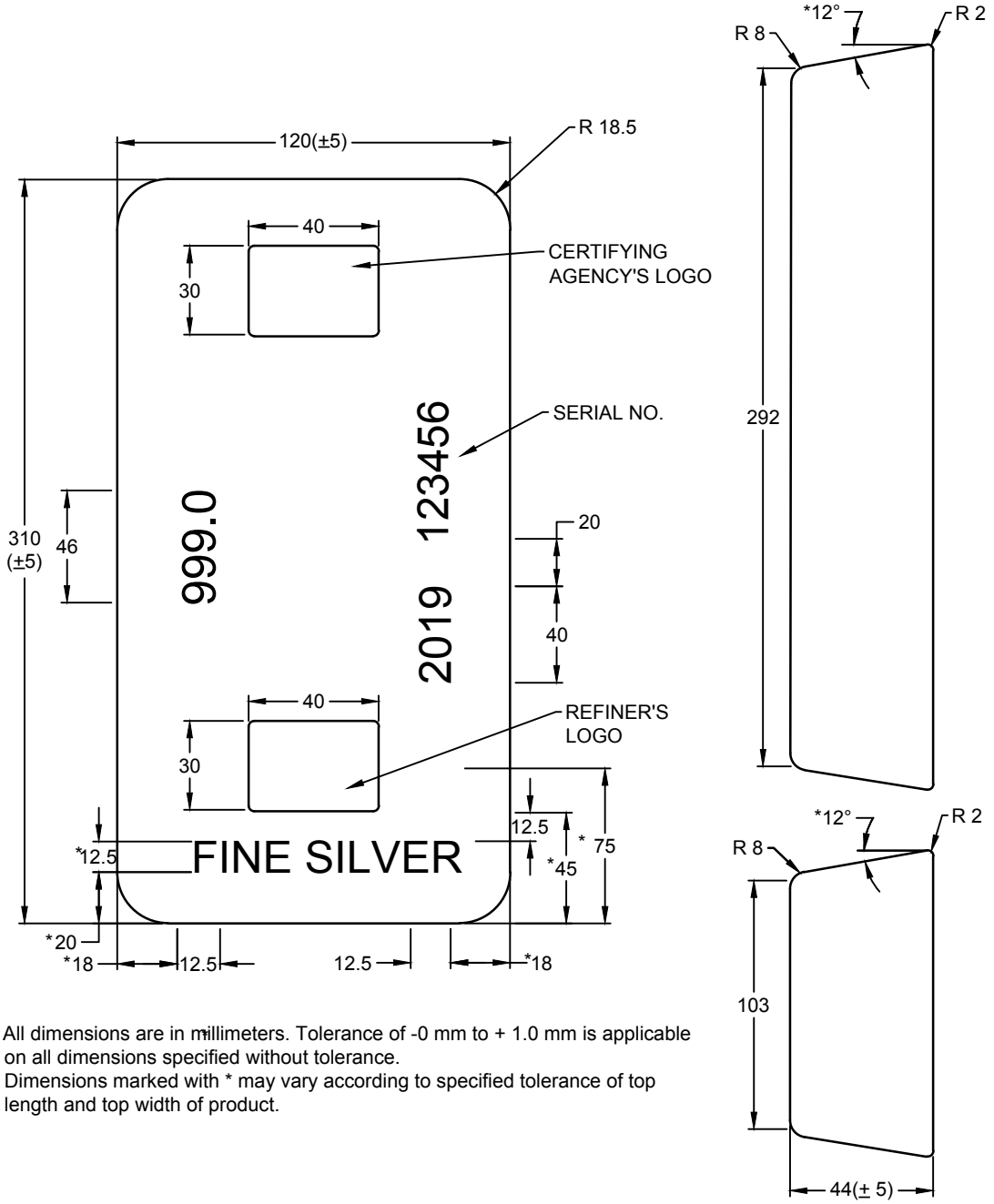
NOTE : 1 All dimensions are in millimeters and to be measured with steel rule.
2 Dimension may vary according to specified tolerance of top length and top width.
3 All radial measurements are subjects to tolerance variance of 0.5 mm.

ANNEX B

(*Clauses* 8.3 (b) *and* 12.3)

SPECIMEN TECHNICAL LINE DRAWING

B-1 STANDARD REFINED SILVER BAR FOR GOOD DELIVERY



NOTE : 1 All dimensions are in millimeters. Tolerance of -0 mm to + 1.0 mm is applicable on all dimensions specified without tolerance.

2 Dimensions marked with * may vary according to specified tolerance of top length and top width of product.

ANNEX C

(*Clause* 9.4)

WEIGHING PROCEDURES

C-1 WEIGHING PROCEDURES

C-1.1 Gold

Bars are weighed on an electronic balance.

C-1.1.1 *Electronic Balance*

Where an electronic balance is used for weighing gold bars it should comply with the following criteria:

a) Capable of weighing gold bars of one-kilo weight in the weight range 1000 gm to 1 001 gm;

b) The scales shall be capable of being CE marked in accordance with all applicable Indian Legal Metrology directives;

c) Verification scale interval (e) ≤ 0.1 g;

d) Readability (d) ≤ 0.01 g;

e) Uncertainty of calibration measurement less than 0.05 g;

f) The readability division (d) values must be capable of being presented on a digital electronic output device (for example, RS232C, USB) after legal verification of the scales;

g) Capable of displaying the metric weight;

h) The accuracy class shall be Class I;

j) The scales shall be capable of being adjusted and calibrated by users by the application of a 1 000 gm stainless steel Class F1 weight for one-kilo bars. The weight's value shall be able to be input digitally in kg;

k) The scales shall have internal calibration masses to enable automatic or semi- automatic adjustments/ calibrations;

m) It shall be possible to adjust the notional value of the internal masses by input of the measured value in kg from a calibration certificate of stainless steel weight;

n) It shall be possible to switch off/on the automated function of the internal masses;

p) The scales shall have a flat-topped impact protection boss, approximately 80 mm in diameter, onto which gold bars can be placed for weighing;

q) The impact protection boss shall be the only part of the scales exposed to the live weighing activity;

r) The scales weighing parts shall be protected against the influences of drafts;

s) The scales shall be capable of verification at least within the range 15°C to 25°C;

t) It shall be possible to separate the scale indicator/ keyboard from the weighing platform so that vibrations are not transmitted to the platform when the keyboard is used;

u) The scales shall be provided with an internal, legal-for-trade alibi memory for saving the weight (kg), date, time, serial or batch number and transaction number;

v) Scales to be compliant with European standard EN 45501 and OIML International Recommendation R76;

w) The scale weighing mechanism shall be rugged and capable of withstanding weighing of multiple kilos of bars every working day;

y) Average stabilization time for each weighing 1.0 s;

z) Average response time 1.5 s;

aa) Electrical power requirement shall be 230 VAC or 115VAC +15 percent, -20 percent;

ab) Ingress protection to IP20; and

ac) Warm-up time after connection to power ≤ 2 h.

C-1.2 Silver

Bars are weighed on an electronic balance.

C-1.2.1 *Electronic Balance*

Electronic balances used for weighing silver bars should comply with the following criteria:

a) Capable of weighing silver from 14 kg to 16 kg;

b) Verification scale interval (e) ≤ 0.1 g;

c) Readability less than 0.1 gm;

d) Internal calibration weight which can be activated automatically or *via* keyboard. Calibration should be undertaken on a daily basis;

e) Maximum eccentricity error not greater than 0.5 gm;

f) Maximum linearity deviation not greater than 0.5 gm;

g) Repeatability not greater than 0.5 gm;

h) Uncertainty of calibration measurement less than 0.5 gm; and

j) Capable of weights and measures verification for weighing silver (that is, a Class I or II balance/ scale having a National or EU Type approval certificate). An electronic balance should remain powered continuously. If for any reason the

balance has been disconnected from the mains or switched off, it should not be used until it has been powered for at least one hour. Electronic balances used for weighing silver generally show the weight to two decimal places. Because of the uncertainty in the second decimal digit, the recorded weight will be reduced to the next lower 0.1 gm division if the second decimal is less than 5. Thus a bar showing a weight of 1 000.95 on the scale would be recorded as 1 000.9 whereas, a bar showing as 1 000.94 would be recorded as 1 000.8.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002	2323 7617, 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi, KOLKATA 700054	2337 8499, 2337 8561, 2337 8626, 2337 9120
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, CHANDIGARH 160019	265 0206, 265 0290
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