भारतीय मानक

IS 26 : 2024

Indian Standard

(*Superseding IS 4280 : 1992*)

टिन इंगट — विशिष्टि

(पाँचवां पुनरीक्षण)

Tin Ingot — Specification

(Fifth Revision)

ICS 77.120.60

भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

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Ores and Feed Stock for Non-Ferrous (Excluding Aluminium and Copper) Industry, their Metals/ Alloys and Products Sectional Committee, MTD 09

FOREWORD

This Indian Standard (Fifth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Ores and Feed Stock for Non-Ferrous (Excluding Aluminium and Copper) Industry, their Metals/ Alloys and Products Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This Indian Standard was first published in 1950 and subsequently revised in 1956, 1966, 1977 and 1992. While reviewing the standard the Committee felt to revise this standard keeping in view the latest developments in the tin production and refining process and also to modify the grades in the standard which have international acceptance and traded on various commodity exchanges. In the present revision, the following major modifications current have been made:

a) The scope of the standard has been modified to cover the refined tin produced from either primary or secondary source or a combination of both, in line with the international practices;
b) Amendment No.1 issued to the previous version of the standard has been incorporated and no changes have been done to the composition of grades namely Sn99.75 and Sn99.85 which were introduced through the Amendment No.1;
c) Clause **2** on references has been modified;
d) A new **3** on terminology has been added;
e) Clause **4** on classification and grades has been modified and 4 new grades have been included namely Sn99.90, Sn99.93, Sn99.95 and Sn99.99 and the designation of the grades have been done as per their minimum tin content;
f) Clause **6** on manufacture has been modified which does not restrict the use of secondary tin bearing materials;
g) Clause **7** on chemical composition has been modified to include the requirements chemical composition of the 4 new grades of tin ingots;
h) A new **9** on shape and mass has been incorporated;
j) Clause **10** on sampling has been modified;
k) A new **13** on packaging has been added; and
m) A new **14.2** on marking of bundles has been added.

Since, the requirements of primary tin and refined secondary tin, which were previously covered in separate standards IS 26 : 1992 ‘Tin ingot — Specification (*fourth revision*)’ and IS 4280 : 1992 ‘Refined secondary tin — Ingot — Specification (*second revision*)’ respectively are now covered in this current revision of IS 26 standard with a title of tin ingot. Hence, this current revision of IS 26 supersedes IS 26 : 1992 ‘Tin ingot — Specification (*fourth revision*)’ and IS 4280 : 1992 ‘Refined secondary tin — Ingot — Specification (*second revision*)’.

The composition of the Committee responsible for the formulation of the 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 in this standard.

Indian Standard

TIN INGOT — SPECIFICATION

(Fifth Revision)

1 SCOPE

The standard covers the requirement of refined tin, produced from ore or secondary tin bearing materials in the form of ingots.

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provision 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 these standards:

IS No.	*Title*
IS 1387 : 1993	General requirements for the supply of metallurgical materials (*second revision*)
IS 1817 : 1961	Methods of sampling non-ferrous metals for chemical analysis
IS 1940 : 1969	Methods of chemical analysis of tin ingot (*first revision*)

3 TERMINOLOGY

For the purpose of this standards the definitions given in IS 1817 and the following shall apply:

3.1 Ingot — Cast, unwrought product intended for remelting and/or processing.

NOTE — Usually the shape of the ingot is a rectangular trapezoid with a flat bottom or grooves/notches at the bottom, and with or without protruding ears/lugs at both ends (*see* IS 1817).

3.2 Melt or Cast — It is the product of one furnace or crucible melt. Sometimes the furnace contents are tapped into two or more ladles where the product of each ladle may be called a separate cast.

NOTE — All the ingots from the same cast have the same identifying mark.

3.3 Bundle — Collection of ingots taken from a single cast and secured by banding for the purpose of handling, shipment and storage.

3.4 Batch/Lot — Series of ingots produced from a single uniform melt.

4 CLASSIFICATION AND GRADES

This standard covers six grades of refined tin ingots, designated as follows, in accordance with their minimum tin content:

a) Sn99.75;
b) Sn99.85;
c) Sn99.90;
d) Sn99.93;
e) Sn99.95; and
f) Sn99.99.

5 SUPPLY OF MATERIAL

General requirements relating to the supply of tin ingots shall conform to IS 1387.

5.1 Information to be Given by the Purchaser

5.1.1 *Basis for Order/Enquiry*

While placing an order/enquiry for the purchase of material covered by this specification, the purchaser should specify the following information in enquiry and/or order, to assist the supplier in providing the correct material:

a) The number of this Indian Standard;
b) The designation of the tin grade required, for example, Sn99.97 (*see* Table 1);
c) Chemical composition of each grade (*see* **7**, Table 1 and its accompanying notes);
d) Quantity of product required (metric tonnes or kilograms);
e) Nominal mass of an ingot (in kg) or a bundle (in tonnes);
f) Whether a specific ingot shape and size is required (*see* **9**);
g) Specific marking and packaging requirements (*see* **13**);
h) Whether a certificate of analysis or statement of conformity is required (*see* **14**); and
j) Any other special requirements.

6 RAW MATERIALS AND MANUFACTURE

6.1 The refined tin shall be produced from ore or, secondary tin-bearing materials, or a combination of both to obtain the requirements of this specification.

6.2 The refined tin may be manufactured by fire refining, vacuum refining, electrolytic or electrowinning refining methods, or a combination of these methods.

7 CHEMICAL COMPOSITION

7.1 The chemical composition of the tin ingots shall conform to the requirements as prescribed in Table 1.

7.2 The chemical analysis shall be done either by the methods specified in IS 1940 or by any other established instrumental/wet chemical method. In case of dispute, the procedure specified in IS 1940 shall be the referee method. However, if the method of analysis for a particular element is not given in IS 1940, the referee method for the analysis, shall be as mutually agreed to between the purchaser and the supplier.

NOTE — If it is necessary to determine the content of other impurity elements other than those specified in Table 1, the method of determination shall be as agreed between the purchaser and the supplier.

Table 1 Chemical Composition of the Tin Ingots

(*Clauses* 5.1.1, 7.1, 7.2, 14.1 *and* 14.2)

Sl No.	Grade Designation	Limit of Elements in Mass Percent										
		Sn, *Min*	Sb, *Max*	As, *Max*	Bi, *Max*	Cd, *Max*	Cu, *Max*	Fe, *Max*	Pb, *Max*	Al, *Max*	Zn, *Max*	Total of All Impurities, *Max*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	Sn99.75	99.75	0.08	0.05	0.08	–	0.05	0.01	0.08	–	–	0.25
ii)	Sn99.85	99.85	0.050	0.030	0.030	0.0 010	0.050	0.010	0.05	0.0 010	0.0 010	0.150
iii)	Sn99.90	99.90	0.040	0.030	0.010	0.0 010	0.030	0.005	0.010	0.0 010	0.0 010	0.100
iv)	Sn99.93	99.93	0.040	0.004	0.005	0.0 005	0.010	0.003	0.040	0.0 005	0.0 005	0.070
v)	Sn99.95	99.95	0.015	0.0 040	0.0 050	0.0 005	0.005	0.0 025	0.040	0.0 005	0.0 005	0.050
vi)	Sn99.99	99.99	0.0 010	0.0 005	0.0 001	0.0 005	0.0 005	0.0 001	0.0 040	0.0 005	0.0 005	0.010

NOTES

1 The possible presence of other unnamed/incidental elements is not precluded. However, analysis shall regularly be made only for the impurities listed in the table. The major element (tin) shall be determined by difference between the sum of total elements analysed and 100 percent. By agreement between manufacturer and the purchaser, analysis may be required and limits established for elements not specified in Table 1.

2 For some applications, the purchaser may require individual elements to be specified at the lower levels than the maxima given in this Table 1 and the same shall be stated in the order and/or enquiry by the purchaser.

8 SURFACE CONDITION OF INGOTS

8.1 The surface of the each ingot shall be clean, free of holes and pores, without burs and reasonably free of foreign adhering material.

8.2 Unless otherwise agreed between the purchaser and the supplier, the appearance quality/surface condition of ingots shall be determined visually.

9 SHAPE AND MASS OF INGOTS

The shape and mass of the ingots shall be at the discretion of the supplier, unless a specific shape and the mass of each ingot is agreed between the purchaser and supplier and is stated in the enquiry and/or order. Usually the mass of each ingot is 25 kg ± 1.5 kg.

10 SAMPLING

10.1 Lot

In any consignment, all the tin ingots of the same type, and grade produced from the same cast/melt under uniform conditions of manufacture and offered for inspection at one time. A lot may consist of whole or a part of the quantity ordered for.

10.2 Method of Sampling for Chemical Analysis

10.2.1 *Sampling*

Unless otherwise agreed between the purchaser and the supplier, randomly select a number of sample ingots in accordance with the ingot sampling rate given below for preparing the final sample for chemical analysis. These randomly selected ingots are representative of the total lot of metal:

Sl No.	*Number of Ingots in a Lot*	*Number of Sample Ingots*
(1)	(2)	(3)
i)	1 to 4	1
ii)	5 to 20	2
iii)	21 to 40	4
iv)	41 to 60	6
v)	Above 60	10 percent of ingots in lot

10.2.2 *Sample Preparation*

The method of preparing samples for chemical analysis from ingots selected under **10.2.1** shall be in accordance with IS 1817.

11 RETEST

If the sample prepared under **10.2.2** and tested for chemical composition as per **7.2**, fails to meet the requirements specified under **7.1**, two further samples shall be taken from the same lot of metal and tested for chemical analysis as per **7.2**. If both the test results satisfy the relevant requirements, the lot shall be accepted. Should either of the retests fail, the lot represented shall be deemed as not complying with this standard.

12 INSPECTION

12.1 All inspection and testing of material described in this standard shall be carried out by the manufacturer unless otherwise agreed to between the manufacturer and the purchaser. The inspection requirements shall be stated in the enquiry and order.

12.2 The purchaser shall notify the supplier while placing the order, if he intends to inspect the tin ingots at the supplier's end. The supplier shall provide the purchaser all the necessary facilities for inspection and testing of the lead ingots in accordance with this standard. For this purpose, the purchaser or his representative may by prior arrangement, attend to inspect the tin ingots, to select and identify the test samples for testing and to witness the test being made.

13 PACKAGING

Unless otherwise specified in the enquiry and/or order, tin ingots shall be packed in bundles with corrosion-resistant packaging string/bands such as steel bands of appropriate strength for the purpose of handling, shipment and storage.

14 MARKING

14.1 Ingots

Each ingot shall be legibly marked with the following indelible markings:

a) Tin grade designation (*see* Table 1);
b) Cast/lot number;
c) Mass of the ingot; and
d) Manufacturer's name or trademark.

14.2 Bundles

Tin ingots should be packed in bundles. Each bundle shall have affixed a label giving all the following information:

a) Tin grade designation (*see* Table 1);

b) Cast/lot number;

c) Mass of each ingot;

d) Mass of the bundle; and

e) Manufacturer's name or trademark.

14.3 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 product(s) may be marked with the Standard Mark.

15 TEST CERTIFICATE

The supplier shall provide test certificate for each consignment giving information like cast/lot number and corresponding chemical composition.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Ores and Feed Stock for Non-Ferrous (Excluding Aluminium and Copper) Industry, their Metals/ Alloys and Products Sectional Committee, MTD 09

Organization	*Representative(s)*
CSIR – National Metallurgical Laboratory, Jamshedpur	DR ABHILASH **(*Chairperson*)**
Arya Alloys Private Limited, New Delhi	SHRI AMRENDRA K. JHA
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Indian Rare Earths Limited, Mumbai	SHRI D. SINGH DR B. R. MISHRA (*Alternate*)
IZA India (International Zinc Association), New Delhi	DR RAHUL SHARMA SHRI KENNETH DE SOUZA (*Alternate*)
J G Chemicals Limited, Kolkata	SHRI ANIRUDH JHUNJHUNWALA
Khosla Engineering Private Limited, Pune	SHRI VISHAL KOTHARI
Ministry of Mines, New Delhi	SHRI J. N. SHARMA
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Member Secretary
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SCIENTIST 'B'/ASSISTANT DIRECTOR
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Bureau of Indian Standards

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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 website-www.bis.gov.in or www.standardsbis.in

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