

प्राथमिक सीसा — विशिष्टि
(पाँचवा पुनरीक्षण)

Primary Lead — Specification
(Fifth Revision)

ICS 77.120.60

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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 standard was first published in 1950 and subsequently revised in 1958, 1965, 1977 and 1992. While reviewing the standard the committee felt to revise this standard keeping in view the latest developments in the lead production and refining process and also to modify the grades in the standard which have international acceptance and traded on various commodity exchanges. In this current revision following modification have been made:

- a) The amendments issued previously have been incorporated and their chemical compositions have been modified to align with international standards and global trade practices;
- b) Title and scope of the standard has been modified from 'Pig lead — Specification' to 'Primary lead — Specification', in line with international standards since the pig lead being only one form of the shape of the cast product. Further, the lead can be supplied in the other commercial standard forms or shapes as agreed between the purchaser and the manufacturer or stated in the purchaser's enquiry/order;
- c) Two new grades of primary lead ingots namely Pb99.985 and Pb99.995 have been incorporated;
- d) Grade designations have been changed according to their minimum lead content;
- e) A clause on terminology has been included;
- f) Packaging requirements have been included;
- g) Ordering information clause has been added;
- h) Sampling clause has been modified and new clause for defining the lot has been added; and
- j) Typical uses of various grades of primary lead have been given in Annex A for information and guidance.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirements 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 value (*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
PRIMARY LEAD — SPECIFICATION
(Fifth Revision)

1 SCOPE

1.1 This standard specifies the requirements for primary lead ingots produced from ore or similar raw materials.

1.2 The requirements for reclaimed lead or secondary lead produced from lead scrap as raw material through any refining process are not covered in this standard and are separately covered in IS 3717.

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 edition of these standards:

<i>IS No.</i>	<i>Title</i>
IS 403 : 1964	Method of chemical analysis of lead and antimonial lead (<i>revised</i>)
IS 1387 : 1993	General requirement for the supply of metallurgical materials (<i>second revision</i>)
IS 1817 : 1961	Methods of sampling non-ferrous metals for chemical analysis
IS 3717 : 1977	Specification for refined secondary lead (<i>first revision</i>)
IS 8439 : 1977	Method for sampling of lead and lead alloys

3 TERMINOLOGY

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

3.1 Ingot — Cast 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). Generally, the nominal mass of each ingot is not more than 50 Kg.

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 Primary Lead — Lead produced by any smelting and refining process from ore or similar raw materials.

3.4 Bundle — Collection of ingots taken from a single cast and secured if necessary, for the purpose of handling, shipment and storage.

4 GRADES

This standard covers five grades of primary lead ingots, designated as follows, in accordance with minimum lead content in each grade:

- a) Pb99.90Cu (also called as chemical copper lead)
- b) Pb99.97
- c) Pb99.985
- d) Pb99.99
- e) Pb99.995

5 SUPPLY OF MATERIAL

5.1 General requirements relating to the supply of primary lead ingots shall be in accordance with IS 1387.

5.2 Information to be Given by the Purchaser**5.2.1 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 order to facilitate the enquiry, order and confirmation of order procedures between the purchaser and the supplier:

- a) The number of this Indian Standard;
- b) The grade designation of the primary lead required, for example, Pb99.97; (*see* Table 1 and accompanying notes);
- c) Chemical composition of each grade (*see* Note 1 of Table 1);
- d) Quantity of product required (mass);

- e) Nominal mass of an ingot (in kg) or a bundle (in ton);
- f) When a specific ingot shape and size is required (*see 9*);
- g) Specific marking and packaging requirements (*see 13.2*); and
- h) Test reports (*see 15*).

6 MANUFACTURE

The grades of lead listed in 4 shall be produced by any smelting and refining process from ore or similar raw materials but not from the scrap or secondary lead sources, to meet the chemical compositional requirements of this standard.

7 CHEMICAL COMPOSITION

7.1 The chemical composition of the primary lead ingots shall conform to the requirements as given in Table 1.

7.2 The chemical analysis shall be done either by the methods specified in IS 403 or by any other established instrumental/wet chemical method. In case of dispute, the procedure specified in IS 403 shall be the referee method. However, where the method of analysis for a particular element is not given in IS 403, the referee method for the analysis shall be as mutually agreed to between the purchaser and the manufacturer.

Table 1 Chemical Composition of Primary Lead Ingots*(Clause 7.1)*

SI No.	Grade Designation	Short Designation (see Note 5)	Limit of Elements in Weight Percent												
			Pb, <i>Min</i>	Ag, <i>Max</i>	Fe, <i>Max</i> (see Note 4)	Bi, <i>Max</i>	Cd, <i>Max</i>	Cu, <i>Max</i>	Ni, <i>Max</i>	As, <i>Max</i>	Sb, <i>Max</i>	Sn, <i>Max</i>	Te, <i>Max</i> (see Note 4)	Zn, <i>Max</i>	Total Impurities, <i>Max</i>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
i)	Pb99.90Cu	Pb90	99.90	0.020	0.002	0.025	0.000 3	0.04 to 0.08	0.002	0.001	0.001	0.001	—	0.001	0.10 (see also Note 3)
ii)	Pb99.97	Pb97	99.97	0.007 5	0.002 0	0.030	0.001 0	0.003	0.001 0	0.001 0	0.001 0	0.001 0	0.000 2	0.001	0.03
iii)	Pb99.985	Pb985	99.985	0.002 5	0.001 0	0.015	0.000 2	0.001	0.000 5	0.000 5	0.000 8	0.000 5	0.000 2	0.000 4	0.015
iv)	Pb99.99	Pb99	99.99	0.001 5	0.001 0	0.010	0.000 2	0.001	0.000 2	0.000 5	0.000 8	0.000 5	0.000 2	0.000 4	0.01
v)	Pb99.995	Pb995	99.995	0.001 0	0.000 2	0.001 5	—	0.001 0	0.000 2	0.000 5	0.000 5	0.000 5	0.000 1	0.000 5	0.005

NOTES

1 The possible presence, of other unnamed elements is not precluded. However, analysis should regularly be made only for elements (except lead) listed in the table. The lead content should be determined by difference between the sum of total elements analyzed and 100 percent. By agreement between the purchaser and the manufacturer, 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 the Table 1 and the same shall be stated in the order and/or enquiry by the purchaser.

3 The total impurity content of As+Sb+Sn in Grade Pb99.90Cu shall not exceed 0.002 percent.

4 The determination or non-determination of the elements, tellurium (Te) and iron (Fe), shall be left to the discretion of the manufacturer (that is making the determination of iron and tellurium optional). In case the requirements of tellurium and/or iron are desired by the purchaser or stated in the enquiry/order for some applications, the maximum limits stated in Table 1 for tellurium (Te) and iron (Fe) shall apply.

5 If any practical difficulty arises in marking the lead ingots by grade designation, the short abbreviated designations may be used.

8 FREEDOM FROM DEFECTS

Primary lead ingots shall be reasonably free from dross, slag and other foreign inclusions and shall have a clean surface such that it does not affect the composition and is not detrimental to the use of ingots.

9 SHAPE, SIZE AND MASS

Unless otherwise agreed between the purchaser and the manufacturer or stated in the enquiry/order, the shape, size and mass of the ingots and bundles shall be at the discretion of the manufacturer.

10 SAMPLING AND CRITEREON FOR CONFORMITY

10.1 Lot

In any consignment, all the lead ingots of the same type, and grade produced from same cast/melt under uniform conditions of manufacture and offered for inspection at one time but shall not exceed 20 tones. A lot may consist of the whole or a part of the quantity ordered for.

10.2 Method of Sampling

Unless otherwise agreed between the purchaser and the manufacturer, the number of ingots to be selected and method for preparing samples from the lot of ingots for chemical analysis shall be in accordance with IS 8439.

11 RETEST FOR CHEMICAL ANALYSIS

If the sample prepared under 10.2 fails to meet the requirements specified under 7.1; unless otherwise agreed to between the purchaser and the manufacturer, two new samples shall be taken from the same lot of metal and tested for chemical analysis. If the analysis on both samples satisfy the requirements specified under 7.1, the lot represented shall be accepted. If either of the sample fails, the material shall be taken as not complying with this standard.

12 INSPECTION

12.1 All inspection and testing of primary lead ingots covered in this standard shall be carried out by the manufacturer, unless otherwise agreed. The inspection requirements shall be stated in the enquiry and order.

12.2 The purchaser shall notify the manufacturer while placing the order, if he intends to inspect the lead 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 lead ingots, to select and identify the test samples for testing and to witness the test being made.

13 PACKAGING

13.1 Small lead ingots weighing below 50 kg shall be bundled with corrosion-resistant packaging string of appropriate strength. Large lead ingots weighing usually several hundreds of kilograms are delivered individually without packaging.

13.2 When the purchaser has any special requirement for the packaging of lead ingots, it shall be as agreed between the purchaser and the supplier.

14 MARKING

14.1 Each primary lead ingot shall be legibly marked with the following:

- a) Cast/lot number;
- b) Grade of the primary lead; and
- c) Indication of the source of manufacture/ name of the manufacturer.

14.2 Each bundle of lead ingots shall be provided with marking which is legible and indelible, indicating manufacturer name, product name, grade of primary lead, cast/lot number and net weight.

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)

TYPICAL USES OF LEAD INGOTS

<i>Sl No.</i>	<i>Grade</i>	<i>Typical Uses</i>
(1)	(2)	(3)
i)	Pb99.99	Manufacture of red lead, white lead litharge, optical glasses, accumulator plates, lead sheet. Lead tubes and lead wire for the chemical industry.
ii)	Pb99.97	Used as a basic material to produce lead alloys and the grade is also intended for lead acid battery applications.
iii)	Pb99.90Cu	This grade is intended for applications requiring corrosion protection and formability, for example, in sulphuric acid industry. This grade is made by adding copper to fully refined lead. The copper content significantly improves corrosion resistance and mechanical strength, copper-bearing lead provides corrosion protection in most applications that require high corrosion resistance.
iv)	Pb99.995	This grade is intended for chemical applications where low silver and low bismuth contents are required.
v)	Pb99.985	—

ANNEX B

(Foreword)

COMMITTEE COMPOSITION

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

<i>Organization</i>	<i>Representative(s)</i>
Directorate General Quality Assurance, Katni	SHRI P. MEENA (<i>Chairperson</i>)
Arya Alloys Private Limited, New Delhi	SHRI AMRENDRA K. JHA
Bhabha Atomic Research Centre, Mumbai	DR DHRUVA KUMAR SINGH DR BHASKAR PAUL (<i>Alternate</i>)
Bharat Electronics Limited, Bengaluru	SHRI SHREEDHAR NADIGER SHRI AWADESH KUMAR (<i>Alternate</i>)
BT Solders Private Limited, Bengaluru	SHRI ANANT TOSHNIWAL SHRI S. RAMESH (<i>Alternate</i>)
Chakradhar Chemicals Private Limited, Muzaffarnagar	SHRI NEERAJ KEDIA
CSIR - Central Electrochemical Research Institute, Karaikudi	DR C. NAVEEN KUMAR DR M. JAYA KUMAR (<i>Alternate I</i>) DR N. RAJASEKARAN (<i>Alternate II</i>)
CSIR - National Metallurgical Laboratory, Jamshedpur	DR ABHILASH DR PRATIMA MESHAM (<i>Alternate</i>)
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Directorate General of Quality Assurance, Ministry of Defence, Ichapur	SHRI A. K. VERMA SHRI KARTIKEY SHARMA (<i>Alternate</i>)
Eveready Industries India Limited, Kolkata	SHRI G. PRAHALATHAN SHRI SENTHIL R. PANDIAN (<i>Alternate</i>)
Exide Industries Limited, Kolkata	DR JOYDEEP CHAKRABORTY DR SAGAR SENGUPTA (<i>Alternate</i>)
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Indian Lead Zinc Development Association, New Delhi	SHRI K. SRIDHAR SHRI L. PUGAZHENTHY (<i>Alternate</i>)
Indian Rare Earths Limited, Mumbai	SHRI D. SINGH DR B. R. MISHRA (<i>Alternate</i>)
IZA India (International Zinc Association), New Delhi	DR RAHUL SHARMA SHRI KENNETH DE SOUZA (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
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Khosla Engineering Private Limited, Pune	SHRI VISHAL KOTHARI
Ministry of Mines, New Delhi	SHRI J. N. SHARMA
Mishra Dhatu Nigam Limited, Hyderabad	SHRI GURURAJA U. V SHRIMATI ASHMITA PATRA BANERJEE (<i>Alternate</i>)
MSME Testing Center, New Delhi	SHRI D. D. GAJBHIYE SHRI G.PRASAD (<i>Alternate</i>)
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