भारतीय मानक **IS 13751 : 2023**

Indian Standard

ठोस धातु उद्योग हेतु टंगस्टेन अयस्क — विशिष्टि

(पहला पुनरीक्षण)

Tungsten Ore for Hard Metal Industry — Specification

(First Revision)

ICS 77.160

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

October 2023 **Price Group 4**

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 (First 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.

The standard was originally published in 1993. The current revision has been brought out to bring the standard in the latest style and format of the Indian Standards. It also incorporates Amendments issued to the last version of the standard. In addition, the following changes have been made:

a) Introduction of modified **2** 'References' (as per the latest format);
b) Amendment No. 1 has been incorporated in this current revision;
c) Use of latest style, manner and wordings, etc, such as 'Annex' for 'Appendix';
d) Corrections of editorial/typographical mistakes in the existing standards; and
e) Introduction of marking clause and updating BIS certification clause as per the *Bureau of Indian Standards Act*, 2016.

More than 95 percent of India's demand of tungsten is met by imports. The country imports tungsten as concentrate, ferrotungsten metal and tungsten alloys. The standard covers the requirements for wolframite [$(Fe,Mn)WO_4$] and scheelite ($CaWO_4$) concentrate used in the hard metal industry.

Tungsten production in the country at present is not substantial. However, the intensive exploration work taken up in the last few years has vastly improved the resource position and there is a scope for increasing the production, substantially. As such, it was felt necessary to formulate an Indian Standard for tungsten concentrate for different uses, other than the ferrotungsten which has been covered in IS 1467 : 1993 'Ferrotungsten — Specification (*second revision*)'.

Tungsten ore are mined and beneficiated to yield desired grade concentrate which is starting point for making other downstream/intermediate products like tungstic acid, tungsten metal powder, ferrotungsten, tungsten carbide, etc. The concentrate specification for commercial purpose is in terms of WO_3 (tungsten trioxide) content. Any concentrate with 65 percent or more WO_3 content is considered as saleable material. However, low grade concentrates may also be used to make the intermediate products, provided the product could be obtained at an economical cost and having the desired quality and properties. As such, specifications for the lower grade concentrated cannot be pre-fixed.

This standard contains **4**, **5**, **6** and **7**, which call for agreement between the purchaser and the supplier.

The composition of the Committee responsible for the revision of this standard is given at 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

Tungsten Ore for Hard Metal Industry — Specification

(First Revision)

1 SCOPE

The standard covers the requirements for scheelite ($CaWO_4$) and wolframite [$(Fe,Mn)WO_4$] concentrate used in the hard metal industry.

2 REFERENCES

The standard 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:

IS No.	*Title*
IS 1387 : 1993	General requirements for the supply of metallurgical materials (*second revision*)

3 SUPPLY OF MATERIAL

General requirements relating to the supply of the tungsten concentrate (that is wolframite and scheelite) shall be as laid down in IS 1387.

4 CHEMICAL COMPOSITION

The chemical composition of the material shall conform to the requirements specified in Table 1, when determined by any standard wet chemical/instrumental method as mutually agreed between the purchaser and the supplier.

5 FORM AND SIZE

The form and size of the material shall be as agreed between the purchaser and supplier.

6 SAMPLING

The lot size, method of sampling and number of samples to be tested from the lot and criterion for acceptance of the lot shall be as agreed between the purchaser and supplier.

7 PACKING

The material shall be supplied packed in suitable containers/bags/drums in quantities mutually agreed to between the purchaser and supplier.

8 MARKING

8.1 Each package of the material shall be legibly marked with following indelible markings:

a) Name of the manufacturer;

b) Form and size;

c) Net weight of each package in kg;

d) Batch/Lot number;

e) Type of the concentrate and percentage of tungsten oxide (WO_3) in the concentrate (for example: Wolframite and WO_3 68 percent); and

f) Any other special marking requirements as agreed between the purchaser and the supplier.

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

Table 1 Chemical Composition of Concentrate

(*Clause* 4)

Sl No.	Constituent/Element	Scheelite ($CaWO_4$) in Weight Percent	Wolframite [$(Fe,Mn)WO_4$] in Weight Percent
(1)	(2)	(3)	(4)
i)	Tungsten oxide (WO_3), *Min*	66.0	66.0
ii)	Phosphorous, *Max*	0.05	0.05
iii)	Iron, *Max*	—	3.0
iv)	Arsenic, *Max*	0.05	0.10
v)	Antimony, *Max*	1.5	1.5
vi)	Fluorine, *Max*	1.0	1.0
vii)	Bismuth, *Max*	1.0	1.0
viii)	Tin, *Max*	0.05	—
ix)	Sulphur, *Max*	1.0	1.0
x)	Copper, *Max*	0.5	0.5
xi)	Silicon, *Max*	1.0	1.0
xii)	Manganese, *Max*	—	1.0
xiii)	Calcium, *Max*	0.2	—
xiv)	Calcium + silicon, *Max*	1.0	1.0

NOTE — Till an Indian Standard on the methods of chemical analysis of wolframite concentrate is published, the method of determination of chemical constituents shall be as mutually agreed between the purchaser and the supplier.

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)*
Directorate General Quality Assurance, Katni	SHRI P. MEENA **(*Chairperson*)**
Arya Alloys Private Limited, New Delhi	SHRI AMRENDRA K. JHA
Bhabha Atomic Research Centre, Mumbai	DR DHRUVA KUMAR SINGH DR BHASKAR PAUL (*Alternate*)
Bharat Electronics Limited, Bengaluru	SHRI SHREEDHAR NADIGER SHRI AWADESH KUMAR (*Alternate*)
BT Solders Private Limited, Bengaluru	SHRI ANANT TOSHNIWAL SHRI S. RAMESH (*Alternate*)
Chakradhar Chemicals Private Limited, Muzaffarnagar	SHRI NEERAJ KEDIA
CSIR - Central Electrochemical Research Institute, Karaikudi	DR C. NAVEEN KUMAR DR M. JAYA KUMAR (*Alternate* I) DR N. RAJASEKARAN (*Alternate* II)
CSIR - National Metallurgical Laboratory, Jamshedpur	DR ABHILASH DR PRATIMA MESHRAM (*Alternate*)
Directorate General of Aeronautical Quality Assurance, Ministry of Defence, New Delhi	SHRI SANTHOSH NAMDEO INGOLE
Directorate General of Quality Assurance, Ministry of Defence, Ichapur	SHRI A. K. VERMA SHRI KARTIKEY SHARMA (*Alternate*)
Eveready Industries India Limited, Kolkata	SHRI G. PRAHALATHAN SHRI SENTHIL R. PANDIAN (*Alternate*)
Exide Industries Limited, Kolkata	DR JOYDEEP CHAKRABORTY DR SAGAR SENGUPTA (*Alternate*)
Hindustan Zinc Limited, Udaipur	SHRI M. NAMBI SHRIMATI SHEEBA MASHRUWALA (*Alternate*)
Indian Bureau of Mines, Nagpur	DR D. R. KANUNGO DR JYOTI SHRIVASTAVA (*Alternate*)
Indian Institute of Technology, Roorkee	PROF NIKHIL DHAWAN PROF UJJWAL PRAKASH (*Alternate*)
Indian Lead Zinc Development Association, New Delhi	SHRI K. SRIDHAR SHRI L. PUGAZHENTHY (*Alternate*)
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*)

Organization	*Representative(s)*
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
Mishra Dhatu Nigam Limited, Hyderabad	SHRI GURURAJA U. V SHRIMATI ASHMITA PATRA BANERJEE (*Alternate*)
MSME Testing Center, New Delhi	SHRI D. D. GAJBHIYE SHRI G. PRASAD (*Alternate*)
National Mineral Development Corporation, Hyderabad	SHRI G. VENKATESWARA RAO
National Test House, Kolkata	SHRI D. RAJAGOPALA RAO SHRI SUHAS PINGALE (*Alternate*)
Naval Materials Research Laboratory, Thane	SHRI V. P. DESHMUKH DR A. GOURAV RAO (*Alternate*)
Nile Limited, Hyderabad	SHRI K. H. K. SRINIVAS SHRI S. MAHESH BABU (*Alternate*)
Nuclear Fuel Complex, Hyderabad	SHRI VIJAY KAUSHIK SHRI G. SAMYUKTHA (*Alternate*)
Power Grid Corporation of India, Gurugram	SHRI K. N. M. RAO DR SATISH KUMAR (*Alternate*)
Research Designs and Standards Organisation (RDSO), Lucknow	SHRI DALLU RAM SHRI PRASHANT KUMAR TEWARI (*Alternate*)
RITES Limited, Gurugram	SHRI V. K. DWIVEDI SHRI SANDEEP GUPTA (*Alternate*)
Saru Smelting Private Limited, Meerut	SHRI SHASHANK JAIN SHRI ARUN GUPTA (*Alternate*)
Southern Metals & Alloys Private Limited, Mumbai	SHRI VIVEK NORONHA SHRI VINOD NORONHA (*Alternate*)
The Tinplate Company of India Limited, Jamshedpur	DR SOURAJYOTI DEY SHRI SUBRATA SADHU (*Alternate*)
BIS Directorate General	SHRI SANJIV MAINI, SCIENTIST 'F'/SENIOR DIRECTOR AND SENIOR DIRECTOR AND HEAD (METALLURGICAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI SAAQIB RAAHI
SCIENTIST 'B'/ASSISTANT DIRECTOR
(METALLURGICAL ENGINEERING), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

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

This Indian Standard has been developed from Doc No.: MTD 09 (21573).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
Western	: Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	2821 8093

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.

Published by BIS, New Delhi