

वैनेडियम पेंटोक्साइड के लिए —  
विशिष्टता  
( पहला पुनरीक्षण )

**Vanadium Pentoxide — Specification**  
( *Second Revision* )

ICS 77.100

© BIS 2023



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](http://www.bis.gov.in) [www.standardsbis.in](http://www.standardsbis.in)

## FOREWORD

This Indian Standard (Second Revision) was adopted by Bureau of Indian Standards, after the draft recommended by Ores and Feed Stock for Iron and Steel Industry Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1973 and subsequently revised in 1974. In view of the experience gained during these years it was felt necessary to revise the standard again. The following modifications have been made in this revision:

- a) Reference and manufacturing clauses have been included;
- b) EH&S hazardous waste label and their pictorial representation have been added in **9.2**; and
- c) The standard had been drafted to homogenize its structure and wording with other product standards.

The composition of the committee responsible for the formulation of this standard is listed in Annex B.

For the purpose of deciding whether 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

## VANADIUM PENTOXIDE — SPECIFICATION

( Second Revision )

**1 SCOPE**

This standard covers the requirements of vanadium pentoxide used for the production of ferrovandium.

**2 REFERENCES**

The following standards 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 the standards listed below:

IS No.	Title
IS 1387 : 1993	General requirements for the supply of metallurgical materials ( <i>second revision</i> )
IS 460	Test sieves — Specifications:
(Part 1) : 2020	Wire cloth test sieve ( <i>fourth revision</i> )
(Part 2) : 2020	Perforated plate test sieve ( <i>fourth revision</i> )
(Part 3) : 2020	Methods of examination of apertures of test sieves ( <i>fourth revision</i> )

**3 MANUFACTURE**

Vanadium pentoxide shall be manufactured by any process as agreed between manufacturer and the purchaser.

**4 SUPPLY OF MATERIAL**

**4.1** General requirements relating to the supply of vanadium pentoxide shall be as laid down in IS 1387.

**4.2** The material shall be supplied in the form of properly cleaned lumps, which are free from any slag and non-metallic residues.

**5 CHEMICAL COMPOSITION**

**5.1** The chemical composition of the material shall be as given in Table 1.

**Table 1 Chemical Composition of Vanadium Pentoxide**  
(Clause 5.1 and 5.2)

SI No.	Constituent	Percent
(1)	(2)	(3)
i)	Vanadium (as V <sub>2</sub> O <sub>5</sub> )	98, <i>Min</i>
ii)	Phosphorous (P)	0.05, <i>Max</i>
iii)	Sulphur (S)	0.05, <i>Max</i>
iv)	Antimony (Sb)	0.05, <i>Max</i>
v)	Copper (Cu)	0.05, <i>Max</i>
vi)	Arsenic (As)	0.05, <i>Max</i>
vii)	Alkalis	1.00, <i>Max</i>
viii)	Insolubles (including SiO <sub>2</sub> )	1.00, <i>Max</i>

**5.2** The determination of chemical constituents shall be as agreed to between the purchaser and the supplier. The supply of material of a composition with limits outside those specified in Table 1 shall be subject to agreement between the supplier and the purchaser.

**6 SAMPLING**

The material shall be sampled preferably in an inert atmosphere as agreed to between the purchaser and the manufacturer.

**7 SIZE**

**7.1** The size ranges and tolerance of vanadium pentoxide shall be as agreed to between the purchaser and the supplier. Fines below 3.15 mm shall not exceed 1 percent, unless agreed to between the purchaser and the supplier.

**7.2** The test sieves used shall be in accordance with sizes specified in IS 460 (Part 1) and IS 460 (Part 2). The standard test sieve will, after period of time, become less accurate. The sieve shall, therefore, be periodically checked according to IS 460 (Part 3) and the correction factor to be applied to the result.

**8 PACKING AND HANDLING**

The material shall be supplied, packed in suitable containers, in quantities as mutually agreed to between the purchaser and the supplier. Vanadium pentoxide is toxic and hence should be handled and disposed carefully.

**9. MARKING**

**9.1** Each packed material shall be marked with the following:

- a) Manufacturer's name and his recognized trademark, if any;
- b) Quantity; and
- c) Date of validity, if required.

**9.2** Each packed material shall be fitted with a label/plate containing cautionary notices written in

EH&S hazardous waste label and their pictorial representation as given in Annex A.

**9.3 BIS Certification Marking**

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

**ANNEX A**  
(Clause 9.2)

**EH&S HAZARDOUS WASTE LABEL**

**A-1 LABLING**

Vanadium pentoxide appears as a yellow to red crystalline powder. Slightly soluble in water and denser than water. Contact may cause severe

irritation to skin, eyes, and mucous membranes. May be toxic by ingestion, inhalation and skin absorption. Hence, following EH&S hazardous waste labels given in Fig .1, Fig. 2 and Fig. 3 and adhere it to the bag.



FIG. 1 INDICATES CAN CAUSE CERTAIN HEALTH EFFECTS FOR EXAMPLE, SKIN IRRITATION, EYE IRRITATION, ETC



FIG. 2 INDICATE A CANCER-CAUSING AGENT (CARCINOGEN) OR SUBSTANCE WITH RESPIRATORY, REPRODUCTIVE OR ORGAN TOXICITY THAT CAUSES DAMAGE OVER TIME (A CHRONIC, OR LONG-TERM, HEALTH HAZARD).



FIG. 3 INDICATES CHEMICALS TOXIC TO AQUATIC WILDLIFE (NON-MANDATORY)

**A-2 PPE KIT**

The following PPE kit shall be used by the person using the material:

- a) Wear a lab coat;
- b) Eye protection; and
- c) Nitrile gloves when working with vanadium pentoxide.

**A-3 HAZARDS IDENTIFICATION**

The following signals may be displayed at prominent areas of manufacturing and storage units:

<i>Signal</i>	<i>Danger</i>
GHS hazard statements	H302: Harmful if swallowed (warning acute toxicity, oral) H332: Harmful if inhaled (warning acute toxicity, inhalation) H335: May cause respiratory irritation (warning specific target organ toxicity, single exposure, respiratory tract irritation) H341: Suspected of causing genetic defects (warning germ cell mutagenicity) H361d: Suspected of damaging the unborn child (warning reproductive toxicity) H372: Causes damage to organs through prolonged or repeated exposure (danger Specific target organ toxicity, repeated exposure) H411: Toxic to aquatic life with long lasting effects (hazardous to the aquatic environment, long-term hazard)
Precautionary statement codes	P203, P260, P261, P264, P270, P271, P273, P280, P281, P301+P317, P304+P340, P317, P318, P319, P330, P391, P403+P233, P405, and P501 (The corresponding statement to each P-code can be found at the GHS classification page.)

**ANNEX B**  
(Foreword)

**COMMITTEE COMPOSITION**

Ores and Feedstock for Iron and Steel Industry Sectional Committee, MTD 13

<i>Organization</i>	<i>Representative(s)</i>
National Mineral Development Corporation Limited, Hyderabad	SHRI RAJAN KUMAR ( <i>Chairperson</i> )
Agni Steel Private Limited, Erode	SHRI A. RAJASEKARAN
Arcelor Mittal and Nippon steel India Limited, Visakhapatnam	DR ATANU RANJAN OJHA SHRI CH V. S. ND HARIPRASAD ( <i>Alternate</i> )
Centre for Engineering and Technology (SAIL/CET), Ranchi	SHRI BRAJESH KUMAR SHRI D. K. JAGANI ( <i>Alternate</i> )
CSIR - Institute of Minerals & Materials Technology, Bhubaneswar	DR ASHOK SAHU DR S. P. DAS ( <i>Alternate</i> )
CSIR - National Metallurgical Laboratory, Jamshedpur	DR MANOJ KUMAR MOHANTA
Defence Metallurgical Research Lab, Hyderabad	DR CH R. V. S. NAGESH DR RANJAN KUMAR SINGH ( <i>Alternate</i> )
Facor Alloys Limited, Vizianagaram	SHRI N. S. S. RAMA RAO SHRI R. BHASKARA RAO ( <i>Alternate</i> )
Fomento Resources Private Limited, Gao	SHRI MAHENDRAMANGUESH RAMANI SHRI ABHIJIT PEDNEKAR RAMANI ( <i>Alternate</i> )
Geological Survey of India, Kolkata	DR UTPAL ROY CHOUDHURY DR SHIVDAS ( <i>Alternate</i> )
Jai Balaji Group, Kolkata	SHRI D. SAHOO
Jindal Stainless Limited, Hissar	SHRI ASHISH GOYAL SHRI SUYASH TRIVEDI ( <i>Alternate</i> )
JSW Steel Limited, Bellary	SHRI P. C. MAHAPATRA SHRI C. R. PRAMOD KUMAR ( <i>Alternate</i> )
KIOCL Limited, Bengaluru	SHRI M. A. SALAM SHRI P. PALANI ( <i>Alternate</i> )
Manganese Ore (India) Limited, Nagpur	SHRI. RAJESH BHATTACHARYA SHRIMATI SNEHA TIWAR ( <i>Alternate</i> )
Mineral Exploration Corporation Limited, Nagpur	SHRI P. RAVINDRAN SHRI SANTOSH KUMAR SATAPATHY ( <i>Alternate</i> )
Mitra S.K. Private Limited, Kolkata	SHRI SAJAL MITRA SHRI P. L. BOSE ( <i>Alternate</i> )
M.N. Dastur & Co Limited, Kolkata	SHRI AVIJIT PODDAR
National Institute of Secondary Steel Technology, Mandi Gobindgarh	SHRI RAJIB KUMAR PAUL SHRI SANDEEP PAL SINGH ( <i>Alternate</i> )
National Mineral Development Corporation Limited, Hyderabad	SHRI VIBHUTI ROSHAN

<i>Organization</i>	<i>Representative(s)</i>
National Test House, Kolkata	DR S. K. KULSHRESTHA
Pellet Manufacturer's Association of India, New Delhi	SHRI DEEPAK BHATNAGAR
Rashtriya Ispat Nigam Limited, Visakhapatnam	SHRI T. GOUTHAM SHRI R. MOHANTY ( <i>Alternate</i> )
Shriram Institute for Industrial Research New Delhi	SHRI BALAN GOVIDAN SHRI SHAMBHU THAKUR ( <i>Alternate</i> )
Sponge Iron Manufacturers Association, New Delhi	SHRI D. KASHIVA
Tata Steel, Jamshedpur	DR A. K. MUKHERJEE
BIS Directorate General	SHRI SANJIV MAINI, SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (METALLURGICAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL ( <i>Ex-officio</i> )]

*Member Secretary*

SHRI G. RAM SAI KUMAR  
SCIENTIST 'B'/ASSISTANT DIRECTOR  
(METALLURGICAL ENGINEERING), BIS

Ferroalloys Subcommittee involved in the Finalization-MTD 13 : 01

<i>Organization</i>	<i>Representative(s)</i>
Indira Gandhi Centre for Atomic Research, Kalpakkam	DR M. VASUDEVAN ( <i>Convener</i> )
Bhabha Atomic Research Centre, Mumbai	DR BIKAS CHANDRA MAJI
CSIR - Institute of Minerals & Materials Technology, Bhubaneswar	DR ASHOK SAHU DR S. P. DAS ( <i>Alternate</i> )
CSIR - National Metallurgical Laboratory, Jamshedpur	DR SANJAY AGARWAL DR DAYANAND PASWAN ( <i>Alternate</i> )
Essar Steel India Limited, Mumbai	SHRI J. MAKVANA SHRI MANOJ SWAMY ( <i>Alternate</i> )
Facor Alloys Limited, Vizianagaram	SHRI N. S. S. RAMA RAO SHRI R. BHASKARA RAO ( <i>Alternate</i> )
Indian Ferro Alloy Producers Association, Mumbai	SHRI TANMAYA KUMAR PATTNAIK
Indian Metals & Ferro Alloys Limited, Bhubaneswar	SHRI DINESH KUMAR MOHANTY
Jindal Stainless Limited, Hissar	SHRI ASHISH GOYAL SHRI SUYASH TRIVEDI ( <i>Alternate</i> )
JSW Steel Limited, Karnataka	SHRI C.R. PRAMOD KUMAR
Midhani, Hyderabad	DR RAJASEKHAR
Manganese Ore (India) Limited (MOIL), Nagpur	SHRI RAJESH BHATTACHARYA SHRIMATI SNEHA TIWAR ( <i>Alternate</i> )
Tata Steel Limited, Jamshedpur	DR A. K. MUKHERJEE





## 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

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

### 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](http://www.bis.gov.in) or [www.standardsbis.in](http://www.standardsbis.in).

This Indian Standard has been developed from Doc No.: MTD 13 (21007).

### 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](http://www.bis.gov.in)

### Regional Offices:

Central : 601/A, Konnectus Tower -1, 6<sup>th</sup> Floor,  
DMRC Building, Bhavbhuti Marg, New  
Delhi 110002

Telephones

{ 2323 7617

Eastern : 8<sup>th</sup> 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.