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भारतीय मानक

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(आई एस 7506 *का दूसरा पुनरीक्षण*)

Draft *Indian Standard*

NICKEL POWDER — SPECIFICATION

(Second Revision of IS 7506*)*

ICS No. 77.160

Powder Metallurgical Materials and Products Sectional Committee, MTD 25	Last date of comment : 10 July 2025

FOREWORD

(*Formal clauses to be added later*)

This standard was first published in 1974.and subsequently revised in 1987. While reviewing this standard in the light of experience gained in its usage during these years, the Committee felt that the standard should be revised to bring it in line with the present national and international practices in the field being followed by the Indian industry.

In additional, the following changes have been made:

a) In **2**, Reference clause has been added;
b) In **4**, Manufacturing clause has been added;
c) In **5.3**, Hydrogen loss measurement can be conducted using any established method;
d) In **6**, Other size ranges can be agreed upon;
e) In **8**, Packing clause has been modified;
f) In **9**, Marking clause has been modified; and
g) Annex A is attached which includes all the safety markings and requirements.

For the purpose of 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

NICKEL POWDER - SPECIFICATION

(*Second Revision*)

1 SCOPE

This standard specifies the requirements of nickel powder used for the manufacture of heavy alloys and hard metals.

2 REFERENCES

The standards listed below 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 standards indicated below.

IS	*Title*
IS 1387 : 1993	General requirements for the supply of metallurgical materials (*second revision*)
IS 5644(Part 4) : 2006	Metallic powders - Determination of oxygen content by reduction methods: Part 3 Hydrogen - Reducible oxygen (*Fourth Revision*)
IS 6492 : 2020 ISO 3954 : 2007	Powders for powder metallurgical purposes — Sampling (*first revision*)
IS 7512 : 2006	Method for the determination of average particle size of metal powders by fisher sub-sieve sizer (*first revision*)

3 SUPPLY OF MATERIAL

General requirements relating to the supply of nickel powder shall be as laid down in IS 1387.

4 MANUFACTURING

Nickel powder, used for the manufacture of heavy alloys and hard metals, is typically manufactured through a process called Carbonyl Process. In this process, Nickel reacts with carbon monoxide to form nickel carbonyl gas (Ni(CO)4), which is decomposed back to nickel powder at moderate temperatures with the recovery of carbon monoxide. Any other manufacturing process may be as agreed to between the purchaser and the manufacturer.

5 CHEMICAL COMPOSITION

5.1 The chemical composition of the nickel powder shall be as given in Table 1.

Table 1 Chemical Composition of Nickel Powder

(*Clause* 5.1)

Sl No.	Constituent	Percent
(1)	(2)	(3)

i)	Ni	99, *Min*
ii)	Fe	0.05
iii)	Zn	0.03
iv)	Co	0.10
v)	Cu	0.03
vi)	S	0.005
vii)	Si	0.005
viii)	(Na + K)	0.01
ix)	Ca	0.005
x)	C	0.10
xi)	Hydrogen loss	0.50
NOTE - Composition limits are in PERCENT MAXIMUM, unless shown otherwise		

5.2 Any established instrumental/chemical method may be used for testing the chemical composition, as agreed to between the purchaser and the manufacturer.

5.3 The hydrogen loss shall be determined in accordance with IS 5644 (Part 2) or any other established instrumental method. In case of dispute, the referee method shall be IS 5644 (Part 2).

6 AVERAGE PARTICLE SIZE

The average particle size shall be determined in accordance with IS 7512, and shall be within 2 μm to 7 μm. For specific application, other sizes may be agreed to between the manufacturer and the user.

7 SAMPLING

The sampling of powder for conducting chemical analysis and particle size determination shall be in accordance with IS 6492.

8 PACKING AND HANDLING

8.1 The powder shall be packed in suitable containers in quantity mutually agreed between the purchaser and manufacturer.

8.2 The material used for packing are HDPE bags and in some cases steel drums. The material may be also be vacuum sealed if required by the purchaser.

8.3 Nickel Powder is toxic and hence should be handled and disposed carefully. It is recommended to follow the guidelines given in Annex A.

9 MARKING

9.1 Each container of nickel powder shall be suitably marked with the following information:

a. Nickel powder;
b. Manufacturer’s name;
c. Batch number and date of manufacture of powder; and

d. Net mass of powder in the container;

9.2 Each packed material shall be fitted with a label/plate containing pictorial representation as given in Annex A (*see* Fig. 1, Fig. 2 & Fig. 3).

9.3 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 products may be marked with the Standard Mark.

ANNEX A
(*Clause* 8)

A-1 LABLING

Nickel Power is a silvery-white lustrous metal with a slight golden tinge. Contact may cause severe irritation to skin, eyes, and mucous membranes. May be toxic by ingestion, inhalation and skin absorption. Nickel Powder is flammable solid. 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 FLAMABLE SOLID

A-2 PPE KIT

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

a) Eye/face protection
b) Wear a lab coat; and
c) Nitrile gloves when working with Nickel Powder.

A-3 HAZARDS IDENTIFICATION

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

Signal	Danger
GHS hazard statements	1) H228 Flammable solid. 2) H317 May cause an allergic skin reaction. 3) H351 Suspected of causing cancer. 4) H372 Causes damage to organs through prolonged or repeated exposure if inhaled.

A-4 DISPOSAL OF WASTE GENERATED

a) Whenever possible, rejected materials should be recycled back into the production process if they can be reprocessed or reused.

b) Depending on the nature of the rejection, it may be possible to treat it to render it less hazardous or to recover any valuable materials present.

c) If recycling or treatment is not feasible, proper disposal methods should be followed according to local regulations and guidelines. Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable (nickel powder). Offer surplus and non-recyclable solutions to a licensed disposal company.

d) Efforts should be made to minimize waste generation in the first place through process optimization, material efficiency improvements, and waste reduction strategies.