



उत्पाद मैनुअल
फेरो निकल
IS 4409:2023 के अनुसार

PRODUCT MANUAL FOR
FERRONICKEL
ACCORDING TO IS 4409: 2023

विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो) अनुरूपता मूल्यांकन (विनियम, 2018 की योजना -I के तहत प्रमाणन के संचालन में एकरूपता और पारदर्शिता के लिए इस उत्पाद मैनुअल का उपयोग सभी क्षेत्रीय / शाखा कार्यालयों और लाइसेंसधारियों द्वारा संदर्भ सामग्री के रूप में किया जाएगा। दस्तावेज़ का उपयोग बीआईएस प्रमाणन प्राप्त करने के इच्छुक संभावित आवेदकों द्वारा भी किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	उत्प Product	:	IS 4409: 2023
	शीर्षक Title	:	Ferronickel
	संशोधन संख्या No. of Amendments	:	Nil
2.	नमूना दिशानिर्देश Sampling Guidelines:		
a)	कच्चा माल Raw material	:	No specific requirement <i>Note: This section indicates the requirements for raw material (if specified in the IS) for which compliance is to be established during Grant of Licence/Change in Scope of Licence /Factory Surveillance</i>
b)	समूहीकरण दिशानिर्देश Grouping guidelines	:	Please see Annex-A

c)	नमूने का परिमाण Sample Size	:	500 gms approx <i>Note: This section indicates the quantity of the sample of the product and/or the raw material (if applicable), required to be sent to the laboratory for testing, for the purpose of Grant of Licence/Change in Scope of Licence/Factory Surveillance (in case of market surveillance, effort may be made to procure therequired quantity of product sample, as far as possible since raw material sample may not be available in market)</i>
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please see Annex –B
4.	निरीक्षण और परीक्षण की स्कीम Scheme of Inspection and Testing	:	Please see Annex – C
5.	एक दिन में संभावित परीक्षण Possible tests in a day :	:	All tests are possible to be carried in a day <i>Note: This section is for the guidance of BIS Certification Officers/Technical Auditors of BIS Authorized Outside Surveillance Agencies (OSAs) during factory inspection to provide ready reference regarding the tests which can be witnessed during the inspection in the factory by the officer/auditor.</i>
6.	Scope of the Licence:		
	Licence is granted to use Standard Mark as per IS 4409:2023 with the following scope:		
	Name of the product	Ferronickel	
	Grade Designation	Fe Ni 30 LC MS HP HSi,...	

BUREAU OF INDIAN STANDARDS
ManakBhawan, 9, Bahadur Shah
ZafarMarg, New Delhi – 110002

ANNEXURE A**GROUPING GUIDELINES**

1) IS 4409:2023 covers the requirements of ferronickel used in the iron and steel industry. Five designations of Ferronickel have been specified at Table 1 of IS 4409:2023. These grades have been classified further based on their carbon content.

2) For the purpose of GoL/CSoL, the following Grouping Guidelines may be considered: -

Group	Grades		Grouping
1	FeNi20 FeNi30 FeNi40 FeNi50 FeNi70	High Carbon-1 to 3%	Two samples of designations having the lowest and highest nickel content of any (low/medium/high) Si, Cr, P, S content shall be drawn and tested to cover all designations intended to covered in the scope of the licence for the group.
2	FeNi20 FeNi30 FeNi40 FeNi50 FeNi70	Medium Carbon-0.03 to 1%	Two samples of designations having the lowest and highest nickel content of any (low/medium/high) Si, Cr, P, S content shall be drawn and tested to cover all designations intended to covered in the scope of the licence for the group.
3	FeNi20 FeNi30 FeNi40 FeNi50 FeNi70	Low Carbon- 0 to 0.03%	Two samples of designations having the lowest and highest nickel content of any (low/medium/high) Si, Cr, P, S content shall be drawn and tested to cover all designations intended to covered in the scope of the licence for the group.

3) The manufacturer shall declare the designations of Ferro Nickel intended to be covered in the licence as per cl.4.2 of IS 4409:2023.

4) Scope of licence shall be restricted based on the manufacturing and testing facilities available.

5) During operation of licence, samples of each variety covered in the scope of licence, shall be tested in rotation, to the extent possible

ANNEXURE B

LIST OF TEST EQUIPMENTS
(INDICATIVE LIST, FOR GUIDANCE ONLY)

Sl. No.	Tests Used in with Clause Reference	Test Equipment/Chemicals and Identification Numbers (Where applicable)
1.	Nickel, cl.7.1., Table 1 (Determination of Nickel Content by Dimethylglyoxime Gravimetric Method) (Ref IS 17319:2020/ISO 6352:1985)	Analytical Balance <u>Equipment/Reagents/Glasswares :-</u> Nickel Standard Solution, Acetic Acid, Ammonium Hydroxide, Dimethylglyoxime, Hydrochloric Acid, Nitric Acid, Perchloric Acid, Tartaric Acid, Hydrofluoric Acid, Fritted glass filtration crucible, Glass beakers, Pipettes, Volumetric Flasks, Polytetrafluoroethylene (PTFE) beaker, Oven, Desiccator, Watch Glass, Burner, Hot plate, Filter Papers, pH meter, Burette
2.	Phosphorus, cl.7.1., Table Phosphorus Content by Phosphovanadomolybdate Molecular Absorption Spectrometric Method) (Ref IS 17320:2020/ISO 11400:1992)	Molecular Absorption Spectrometer, Analytical Balance <u>Equipment/Reagents/Glasswares :-</u> Nitric Acid, Hydrofluoric Acid, Citric Acid, Monohydrate, 4-methyl-2-pentanone (methyl isobutyl ketone), Hexaammonium Heptamolybdate Tetrahydrate, Ammonium Metavanadate, Sodium Nitrite, Boric Acid, Potassium Dihydrogenorthophosphate, Oven, Desiccator, Hot Plate or Heating Source, Heatable Plastics Beakers (PTFE or PFA), One-Mark Volumetric Flask, Separating Funnel, Filter Papers
3.	Phosphorous, cl.7.1., Table 2 Determination of %P Content by Inductively Coupled Plasma Optical Emission Spectrometric Method IS 17835:2022/ISO 23156:2021	Optical Emission Spectrometer equipped with ICP (Inductive Coupled Plasma) Analytical Balance, Potassium dihydrogen phosphate, Desiccator, Nitric Acid, Hydrochloric acid, Hydrofluoric acid, Perchloric Acid, PTFE Beakers, PP Volumetric flask, Oven,
4.	Silicon, cl.7.1., Table (Determination of Silicon Content by Gravimetric Method) (Ref IS 17321:2020/ISO 8343:1985)	Analytical Balance <u>Equipment/Reagents/Glasswares :-</u> Hydrochloric Acid, Hydrofluoric Acid, Nitric Acid, Perchloric Acid, Sulphuric Acid, Beaker, Platinum Crucible, Muffle Furnace, Desiccator, Watch-Glass, Hot Plate or Heating Source, Filter Papers

5.	Sulphur, cl.7.1., Table (Determination of Sulfur Content by Iodimetric Titration Method after Induction Furnace Combustion) (Ref IS 17322:2020/ ISO 7527:1985).	High Frequency Induction Furnace, Analytical Balance <u>Equipment/Reagents/Glasswares</u> :- Oxygen (99.5 % pure), Ascarite or Soda Lime, Magnesium Perchlorate, Glass-wool, Ceramic Crucibles and Lids, Resistance Furnace, Desiccator, Fluxes- Low Sulfur Tin, Copper plus tin, copper or Vanadium pentoxide, Low Sulfur copper, iron, Tungsten or Nickel, Accelerators- Low sulfur copper, iron, tungsten or nickel, Low sulfur nickel, Standard reference steel, Hydrochloric Acid, Soluble Starch, Beaker, Hot Plate, Potassium Iodide, Potassium iodate, Sodium Hydroxide, One-Mark Volumetric Flask, Titration Assembly, crucible
6.	Sulphur, cl.7.1., Table 2 (Determination of Sulfur content by Infra- red Absorption method after Induction Furnace Combustion)(Ref ISO 17323:2020/ISO 7526:1985)	High Frequency Induction Furnace, Pressure Regulator, Infrared Absorption Equipment, Analytical Balance <u>Equipment/Reagents/Glasswares</u> :- Oxygen (99.5 % pure), Ascarite or Soda Lime, Magnesium Perchlorate, Glass-wool, Ceramic Crucibles and Lids, Resistance Furnace, Desiccator, Fluxes- Low Sulfur Tin, Copper plus tin, Tungsten or Nickel, Accelerators- Low sulfur copper, iron, tungsten or nickel, Low sulfur nickel, Standard reference steels
7.	Carbon , cl.7.1., Table 2 (Determination of Carbon Content by Infra- Red Absorption Method after Induction Furnace Combustion) (Ref IS 17324:2020/ISO 7524:1985)	High Frequency Induction Furnace, Pressure Regulator, Infrared Absorption Equipment, Analytical Balance <u>Equipment/Reagents/Glasswares</u> :- Oxygen (99.5 % pure), Ascarite or Soda Lime, Magnesium Perchlorate, Glass-wool, Ceramic Crucibles and Lids, Resistance Furnace, Desiccator, Fluxes- Low Carbon Tin, Copper plus tin or Copper, Accelerators- Low carbon copper, iron, tungsten or nickel, Standard reference steels
8.	Cobalt, cl.7.1., Table (Determination Cobalt Content by Flame Atomic Absorption Spectrometric Method) (Ref IS 17325:2020/IS O 7520:1985)	Atomic Absorption Spectrometer, Analytical Balance <u>Equipment/Reagents/Glasswares</u> :- Hydrochloric Acid, Nitric Acid, Perchloric Acid, Hydrofluoric Acid, Lanthanum Chloride Hexahydrate, Glass Beakers, One-Mark Volumetric Flask, Nickel powder, Iron Powder, Cobalt Powder, Hot Plate, PTFE Beaker, Titration Assembly, Watch-Glass, Filter Paper, Cobalt Hollow Cathode Lamp (Wavelength 240.7 nm)
9.	Cobalt cl.7.1., Table 2 Determination of Cobalt Content by Inductively Coupled Plasma Optical Emission Spectrometric Method IS 17835:2022/ISO 23156:2021	Optical Emission Spectrometer equipped with ICP (Inductively Coupled Plasma) Analytical Balance, Cobalt (Purity 99.95%), Nitric Acid, Hydrochloric acid, Hydrofluoric acid, Perchloric Acid, PTFE Beakers, PP Volumetric flask,

10.	Manganese cl.7.1.,Table 2 Determination of Mn Content by Inductively Coupled Plasma Optical Emission Spectrometric Method IS 17835:2022/ISO 23156:2021	Optical Emission Spectrometer equipped with ICP (Inductive Coupled Plasma) Analytical Balance, Mn (Purity 99.95%), Nitric Acid, Hydrochloric acid, Hydrofluoric acid, Perchloric Acid, PTFE Beakers, PP Volumetric flask, Oven,
11.	Chromium (Cr) cl.7.1.,Table 2 Determination of Cr Content by Inductively Coupled Plasma Optical Emission Spectrometric Method IS 17835:2022/ISO 23156:2021	Optical Emission Spectrometer equipped with ICP (Inductive Coupled Plasma) Analytical Balance, Cr (Purity 99.99%), Hydrochloric acid, Hydrofluoric acid, Perchloric Acid, PTFE Beakers, PP Volumetric flask, Oven, Hot Plate
12.	Copper (Cu) cl.7.1.,Table Determination of Cr Content by Inductively Coupled Plasma Optical Emission Spectrometric Method IS 17835:2022/ISO 23156:2021	Optical Emission Spectrometer equipped with ICP (Inductive Coupled Plasma) Analytical Balance, Cu (Purity 99.95%), Hydrochloric acid, Hydrofluoric acid, Perchloric Acid, PTFE Beakers, PP Volumetric flask, Oven, Hot Plate

Note: 1. Any other established Instrumental or Chemical method may also be used for Chemical composition. However, in case of dispute the procedure given in latest version of above mentioned IS/ISO Standard

ANNEXURE C

SCHEME OF INSPECTION AND TESTING

1. QUALITY ASSURANCE PLAN

1.1 It is expected that manufacturers (licensees/applicants) will implement a Quality Assurance Plan i.e. a plan of regular testing and in-process controls, designed to ensure that the product bearing the Standard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan defining the control unit (i.e. lot/batch etc.) and the levels of control (i.e. the frequency and number of samples for conducting the different tests as per the Indian Standard) and submit the same to BIS Branch Office for information. The manufacturer shall comply with the same and maintain test records in accordance with para 2.4.

1.3 RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT:

1.3.1 For the guidance of manufacturers, the recommended definition of control unit is : **For the purpose of this scheme, each cast/melt of Ferro Nickel manufactured at a time shall constitute a control unit.**

1.3.2 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in **Table 1**.

1.3.3 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan. Alternatively, the manufacturer has the option of adherence to the quality plan as per levels of control recommended in column 3 of Table 1.

1.4 However, all manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard.

2. ENSURING COMPLIANCE THROUGH TESTING- It is expected that manufacturers (licensees/applicants) will establish a suitably equipped and staffed in house laboratory (In house testing facility) for testing at least those parameters of the Indian Standard which require routine testing for ensuring quality of the product. This includes in-process controls as may be defined and put in place by the manufacturer and testing parameters/requirements which can only be performed in the factory.

2.1 For the guidance of manufacturers, Table 1 giving the recommended levels of control is given below. Column 2 of Table 1 indicates routine tests where test equipment is required in house as "R" or other tests which can be subcontracted as "S". Subcontracting is permitted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.2 For MSME manufacturers, the requirement of maintaining a laboratory/in-house testing facility for routine tests (indicated as "R" in Column 2 of Table 1) is also optional.

2.2.1 MSME manufacturers may utilize common cluster based facilities as per guidelines for the utilization of cluster based test facilities by MSMEs or the provisions of Sharing of testing facilities or get testing done from BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.3 Large Scale manufacturers shall maintain an in-house laboratory equipped at least with test facilities for routine tests (indicated as "R" in Column 2 of Table 1), where different tests given in the specification shall be carried out in accordance with the method given in the specification. They shall also implement a calibration plan for the in-house test equipment.

2.3.1 Alternatively, in lieu of an in-house laboratory, large scale manufacturers can also utilize the provisions of Sharing of testing facilities as per the Guidelines for Grant of Licence available on BIS website www.bis.gov.in. (Under Conformity Assessment>Product Certification Process). Even for subcontracted tests, provisions for sharing of testing facilities can be utilized.

2.4 TEST RECORDS- The manufacturers maintaining an in-house laboratory or utilizing common cluster based facilities or shared test facilities shall maintain test records for the tests carried out to establish conformity. For the tests being subcontracted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025, test reports issued by the laboratories shall be available for inspection by BIS.

3. PACKING AND MARKING - The Standard Mark as given in the Schedule of the licence shall be incorporated legibly and indelibly on each bag or container of Ferro Nickel, provided always that the material so marked conforms to each requirement of the specification.

3.1 Packing and Marking shall be done as per the provisions of the Indian Standard.

4. TEST CERTIFICATE - For each consignment of BIS Certified Material conforming to IS 4409:2023, the manufacturer shall issue a Test Certificate as per the format enclosed as Annexure-I.

5. REJECTION - All the production which conforms to the Indian Standard and covered under the scope of this licence shall be marked with the Standard Mark. Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016

TABLE 1 (FOR GUIDANCE PURPOSES ONLY)

(1)				(2)	(3)		(4)
TEST DETAILS					LEVELS OF CONTROL		REMARKS
Clause	Requirements	Test Method		Test equipment requirement R: required (or) S: Sub-contracting permitted	No. of Samples	Frequency	
		Clause	Reference				
7.1, Table 1, Table 2	Chemical Composition						
	i) Nickel	4.1, 4.2, 7.1, 7.2, Annex B, Table 1	IS 4409 IS 17319:2020/ISO 6352:1985 or Any established instrumental/chemical method as agreed to between the purchaser	R	One	Each Cast/Melt	
	ii) Cobalt	4.1, 4.2, 7.1, 7.2, Annex B, Table 1	IS 4409 IS 17325:2020/ISO 7520:1985 or IS 17835:2022/ISO 23156:2021or Any established instrumental/chemical method as agreed to between the purchaser	R	One	----do----	
	iii) Carbon	4.2, 7.1, 7.2, Table 2 ,Annex B	IS 4409 IS 17324:2020/I SO 7524:1985 or 2021or Any established instrumental/chemical method asagreed to between the purchaser	R	One	----do----	

	iv) Silicon	4.2, 7.1, 7.2, Table 2 ,Annex B	IS 4409 IS 17321:2020/ISO 8343:1985 or Any established instrumental/chemical method as agreed to between the purchaser	R	One	----do----	
	v) Manganese	4.2, 7.1, 7.2, Table 2 ,Annex B	IS 4409 IS 17835:2022/ISO 23156:2021 or Any established instrumental/chemical method as agreed to between the purchaser	R	One	----do----	
	vi) Phosphorus	4.2, 7.1, 7.2, Table 2 ,Annex B	IS 4409 IS 17320:2020/ISO 11400:1992 IS 17835:2022/ISO 23156:2021 or Any established instrumental/chemical method as agreed to between the purchaser	R	One	----do----	
	vii) Sulphur	4.2, 7.1, 7.2, Table 2 ,Annex B	IS 4409 ISO 17323:2020/ISO 7526:1985 or IS 17323:2020ISO7527:198 5 or Any established instrumental/chemical method as agreed to between the purchaser	R	One	----do----	
	viii) Chromium	4.2, 7.1, 7.2, Table 2 ,Annex B	IS 4409 IS 17835:2022/ISO 23156:2021 or Any established instrumental/chemical method as agreed to between the purchaser	R	One	----do----	
	ix) Copper	4.2, 7.1, 7.2, Table 2 ,Annex B	IS 4409 IS 17835:2022/ISO 23156:2021 or Any established instrumental/chemical method as	R	One	----do----	

			agreed to between the purchaser				
	Other Elements (such as As, Bi, Pb, Sn and Sb)	4.2, 7.1., 7.2., Note 4, Table 2,	IS 4409 Any established instrumental.chemical method as agreed to between the purchaser and manufacturer	S	Adequate inspection to ensure that the limits of these elements do not exceed as specified in Note 4 or as agreed between the manufacturer and purchaser.		
8	Form of delivery and Formation of Lots	8.1, 8.1.1, 8.1.2, 8.1.3	IS 4409	Ferro Nickel can be delivered in various forms and sizes as per agreement between the manufacturer and purchaser. Adequate inspection to ensure that the supply of each form is as per the requirements specified (See cl.8.1.1 to cl.8.1.3)			

ANNEXURE I

XYZ IRON AND STEEL COMPANY

(Registered office Address and works address)

TEST CERTIFICATE FOR Specification for Ferro Nickel

TEST CERTIFICATE No.



To M/s_____

DATE_____

We certified that the material described below fully conforms to **IS 4409:2023** Chemical composition and Mechanical properties of the product, as tested in accordance with the Scheme of Testing and Inspection contained in the BIS Certification Marks Licence No.CM/L_____are as indicated below against each order No.

(PLEASE REFER TO **IS 4409:2023** FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	Size	Control Unit No.	Grade Designation	Quantity in tonnes	CHEMICAL COMPOSITION									Form of Delivery and Formation of Lots	Remarks
					Ni	C	Si	Mn	S%	P%	Cr%	Cu%	Co%		
					%	%	%	%	%	%	%	%			

REMARKS

WAGON NO.

TRUCK NO.

(It is suggested that size A4 paper be used for this test certificate)

FOR XYZ COMPANY