



फेरो मो लब्डेनम- व शष्ट IS 1469:1993 के अनुसार

**PRODUCT MANUAL FOR SPECIFICATION FOR FERROMOLYBDENUM- SPECIFICATION
ACCORDING TO IS 1469:1993**

व भन्न उत्पादों के लए भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) वनियम, 2018 की योजना -I के तहत प्रमाणन के संचालन में एकरूपता और पारदर्शिता के लए इस उत्पाद मैनुअल का उपयोग सभी क्षेत्रीय / शाखा कार्यालयों और लाइसेंसधारियों द्वारा संदर्भ सामग्री के रूप में किया जाएगा। दस्तावेज 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.	मानक संख्या IS No.	:	IS 1469:1993
	शीर्षक Title	:	Ferromolybdenum- Specification
	संशोधनों की संख्या No. of Amendments	:	1
2.	नमूना दिशानिर्देश Sampling Guidelines:		
a)	कच्चा माल Raw material	:	No specific requirement for raw material 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.
b)	समूहीकरण दिशानिर्देश Grouping guidelines	:	Please refer Annex A
c)	नमूने का परिमाण Sample Size	:	500 gms approx. . for Chemical Composition only (Sampling to be done as per IS 1472) 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 the required quantity of product sample, as far as possible since raw material sample may not be available in market)
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please refer ANNEX – B
4.	निरीक्षण और परीक्षण की स्कीम Scheme of Inspection and Testing	:	Please refer ANNEX – C
5.	एक दिन में संभावित परीक्षण Possible tests in a day:		All tests are possible in a day 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 readyreference regarding the tests which can be witnessed during the inspection in the factory by the officer/auditor.
6.	लाइसेंस का दायरा /Scope of the Licence:		
	“Licence is granted to use Standard Mark as per IS 1469:1993 with the following scope:		
	Name of the product		Ferromolybdenum
	Grade		High Carbon: FeMo 57C600,... Medium Carbon: FeMo 57C50,... Low Carbon: FeMo 63C10,...
	Particle Size Range/Designation		1(Over 50 mm to up to and including 100 mm), 2 (Over 25 mm to up to and including 50 mm),.... Or any other Particle Size Range as per agreement between manufacturer and purchaser

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New Delhi – 110002

ANNEX A**GROUPING GUIDELINES**

1. For the purpose of GoL/CSoL, the following Grouping Guidelines shall be considered:

A) Grouping on the basis of Grades:

A.1 Manufacturer shall declare the Grades intended to be covered in the Licence within each Category of Ferro Molybdenum as specified at Table 1 of IS 1469:1983.

Category	Grade	Remarks
High Carbon	FeMo 63C600 FeMo 57C600	One sample of any Grade shall be drawn and tested (Also See A.2)
Medium Carbon	FeMo 57C50 FeMo 63C50 FeMo 67C50 FeMo 72C50	One sample of any Grade shall be drawn and tested (Also See A.2)
Low Carbon	FeMo 63C10 FeMo 67C10	One sample of any Grade shall be drawn and tested (Also See A.2)

A.2 Evidence of manufacturing capability, such as Mill Test Certificates (MTCs) (of earlier consignments), of all Grades intended to be covered in the Licence within each Category of Ferro Molybdenum shall be submitted by the manufacturer and their conformity to the requirements of IS 1469:1993 shall be established before endorsing all Grades in the Scope. In case of non-availability of MTCs (of earlier consignments), samples of all those Grades shall also be drawn and tested within each Category.

B) Grouping on the basis of Size Range:

B.1 The Particle Size Range(s) for the supply of Ferro Molybdenum shall be declared by the manufacturer. The requirements of Particle Size Range as per cl.9. of IS 1469:1993 shall be tested during factory testing only. **No sample shall be drawn for the requirements of Particle Size Range for Independent Testing.**

2.2 If manufacturer intends to supply Ferro Molybdenum in more than 1 Size Range, any one Size Range shall be tested in the factory during Preliminary Inspection and all Size Ranges shall be covered in the scope of licence based upon manufacturing capability available.

2. Scope of licence shall be restricted based on the manufacturing and testing facilities available.
3. During operation of licence, samples of each variety covered in the scope of licence, shall be tested in rotation, to the extent possible.



ANNEX B
List of Test Equipment
(INDICATIVE LIST, FOR GUIDANCE ONLY)

Sl. No.	Tests used in with Clause Reference	Test Equipment
1	Preparation of specimen for chemical composition	Rough Polishing Machine, Cutting Machine, Fine Polishing Machine, Grinder Machine
2	Clause 8 Mo, C, Si, S, P, Cu, Al, Pb, Sn	Instrumental methods Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry, XRF fluorescence Spectrophotometer Spectrophotometer Standard Reference Material with certificate
3	Mo content (Cl 8) (Chemical method, alternative to instrumental method)	Whatman Filter paper Determination of Molybdenum by 8-Hydroxyquinoline Precipitation (Gravimetric method) • Dilute Sulphuric Acid, 1:1 (v/v) • Concentrated Nitric Acid, rd=1.42, conforming to IS 264 : 1976. • Hydrofluoric Acid, 40 percent. • Concentrated Hydrochloric Acid, rd = 1.16, conforming to IS 265 : 1976. • Sodium Hydroxide Solution, 25 percent • EDTA Solution, 1 percent (m/v). • Ammonium Oxalate, Solid. • Dilute Hydrochloric Acid, 1 : 1 (V/V). • Ammonia Solution, 1 : 1 (v/v). • 8-Hydroxyquinoline Oxine Solution • Weighing Balance, LC 1.0gm • Platinum Crucible • Heating arrangement (up to 500°C to 550°C) • Beaker, Funnel, Volumetric Flask,

		• dry Whatman No. 541 paper, • pH meter Determination of Molybdenum by the Permanganate Titration Method • Jones Reductor, conforming to the dimensions shown in Fig. 1 of IS 12614 Part 1 • Dilute Nitric Acid, 1.3 (v/v). • Hydrofluoric Acid, 40 percent • Dilute Sulphuric Acid, 1:1, 1:4, 5:95 and 3:97 (V/V).\ • Dilute Ammonium Hydroxide, 1 : 3 and 1 : 5 (v/v) • Concentrated Ammonium Hydroxide, rd = 0:90. • Tartaric Acid, Solid • Hydrogen Sulphide, gas • Ammonium Sulphide Wash Solution, saturated ammonium hydroxide (1 : 99) with hydrogen sulphide. • Tartaric Acid Wash Solution, 10 g of tartaric acid dissolved in one litre of dilute sulphuric acid (1 : 99) and saturated with hydrogen sulphide gas. • Concentrated Sulphuric Acid, rd = 1.84 (conforming to IS 266 :1977). • Concentrated Nitric Acid, rd=1.42, conforming to IS 264 : 1976 • Potassium Permanganate Solution, 2.5 percent (v/v). • Zinc (5 mm to 0.7 mm), not containing more than 0.002 percent of iron. • Ferric Sulphate Solution, 80 g of ferric sulphate dissolved in one litre of dilute sulphuric acid (1:4). • Phosphoric Acid, 85 percent. • Standard Potassium Permanganate Solution (0.1 N) • Gooch Crucible or fritted glass crucible of fine porosity • Sodium Oxalate • Weighing Balance, LC 0.001 gm • Heating arrangement • Aluminium Persulphate, solid • Potassium Thiocyanate Solution, 5 percent (mlv). • Stannous Chloride Solution
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		- Dilute Hydrochloric acid - Metallic Tin - Isopropyl Ether - Standard Molybdenum Solution (1 ml = 0.000 5 g of Mo). Conical Flask, Beaker, and other glassware as required
4	C content (CI 8) (Chemical method, alternative to instrumental method)	Organic Solvent for sample cleaning (ether of acetone), Hot air oven (100±5°C) DETERMINATION OF TOTAL CARBON BY DIRECT COMBUSTION (VOLUMETRIC METHOD) - Apparatus as given in IS 6226 (Part 1) : 1971 - Potassium Hydroxide Solution, 30 percent (m/v) - Concentrated Sulphuric Acid, rd = 1.84(conforming to IS 266 : 1977) - Sodalime, granules (0.80 – 2.0 mm) - Potassium Permanganate, solid - Dilute Sulphuric Acid, 2 percent (v/v) - Fluxes, pure tin and iron (99.99 percent pure) - Weighing balance (LC 0.5 gm) - zirconia based or alumina refractory boat. - Furnace (up to 1300°C) - Availability for stream of oxygen - standard ferromolybdenum of known carbon content Burette, Flask and other glassware
5	Si content (CI 8) (Chemical method, alternative to instrumental method)	Determination of Silicon by Gravimetric method - Dilute Nitric Acid, 1:3 (v/v) - Dilute Sulphuric Acid, 1:1 (v/v) - Dilute Hydrochloric Acid, 1: 4 (v/v) and 1:20 (v/v). - Hydrofluoric Acid, 40 per cent - Weighing balance (LC 1 gm) - Pyrex Glass beaker - Hot Plate - Platinum Crucible Heating arrangement for temperature up to 1000°C
6	S content (CI 8) (Chemical method, alternative to instrumental method)	Determination Of Sulphur By Iodimetric Titration Method After Combustion - Oxygen, 99.5 percent, Min - Sodalime (0.80 – 2.0 mm) - Magnesium Perchlorate (MgClO_4) (0.80 – 2.0 mm) - Combustion boat

		- Furnace (up to 1300°C) - Fluxes, pure iron and tin combined. - Dilute Hydrochloric Acid, 1 : 30 (V/V) - Standard Potassium Iodate Solution - Starch Solution - Apparatus recommended in IS 6226 (Part 2) :1987 - Weighing balance (LC 0.5 gm) Burette, Flask and other glassware
7	P content (Cl 8) (Chemical method, alternative to instrumental method)	- Concentrated Nitric Acid, rd=1.42 (conforming to IS 264 : 1976) - Concentrated Hydrochloric Acid, rd = 1.16 (Conforming to IS 265 : 1976) - Dilute Sulphuric Acid, 1:1(v/v) - Dilute Hydrochloric Acid 1:1, 1:5 (v/v) - Ammonium Hydroxide, rd=0.90 - Dilute Nitric Acid 1:3, 1:99 (V/V) - Ammonium Molybdate Solution - Solution A- Dissolve 100 g of molybdic acid (MoO₃) (85 percent) or 118 g of ammonium molybdate in a mixture of 145 ml of ammonium hydroxide and 270 ml of water. - Solution B- Add 490 ml of concentrated nitric acid to 1150 ml of water and cool. - Potassium Nitrate, 2 percent - Standard Sodium Hydroxide Solution, (0.1N) - Standard Nitric Acid (0.1 N) - Weighing Balance - Heating arrangement - Filter Paper Beaker, Flask and other glassware as per requirement
8	Cu content (Cl 8) (Chemical method, alternative to instrumental method)	DETERMINATION OF COPPER IN FERRO-MOLYBDENUM BY THIOSULPHATE IODIDE METHOD - Dilute Nitric Acid, 1 : 3 (v/v). - Hydrofluoric Acid, 40 percent. - Concentrated Sulphuric Acid, rd = 1.84 (conforming to IS 266 :1977). - Sodium Hydroxide Solution, 10 percent (m/v). - Dilute Sulphuric Acid, 1:3, 1:4 and 1:99 (v/v). - Sodium Thiosulphate Solution, 50 percent (m/v). - Hydrogen Sulphide, gas. - Concentrated Nitric Acid, rd = 1'42 (conforming to IS 264:1976). - Sodium Fluoride, solid.

		• Dilute Ammonium Hydroxide, 1:1 (m/v) • Dilute Acetic Acid Solution, 80 percent (m/v). • Potassium Iodide, solid. • Standard Sodium Thiosulphate Solution • Weighing Balance (LC 0.01gm) • Porcelain/ Silica crucible • Heating arrangement (up to 550°C) • Beaker, Flask and other glassware as per requirement • DETERMINATION OF COPPER IN FERRO MOLYBDENUM By SPECTRO- PHOTOMETRIC (DIETHYL DITHIOCARBAMATE METHOD) • Mix Acids- hydrochloric acid, nitric acid and sulphuric acid in the ratio of 1:3:3. • Citric Acid, 20 percent. • Concentrated Ammonia Solution, rd = 0.90. • EDTA Solution, 1 percent (m]v). • Sodium Diethyl Dithiocarbamate Solution, 0.1 percent (m/v). • Carbon Tetrachloride • Standard Copper Solution • Weighing Balance (LC 0.01gm) Beaker, Flask and other glassware as per requirement
9	Al content (CI 8) (Chemical method, alternative to instrumental method)	DETERMINATION OF ALUMINIUM IN FERRO-MOLYBDENUM BY ATOMIC ABSORPTION SPECTROPHOTOMETRIC (AAS METHOD) • Dilute Hydrochloric Acid, 1:1 and 1:50(v/v). • Concentrated Nitric Acid, rd=1.42 (conforming to IS 264 : 1976) • Dilute Sulphuric Acid, 1:1 (v/v) • Hydrofluoric Acid, 40 percent • Potassium Pyrosulphate, solid • Potassium Pyrosulphate Solution • Iron Solution (20 mg Fe/ml) • Molybdenum Solution (25 mg MO/ml) • Standard Aluminium Solution (1 ml = 0.1 mg Al) • Weighing Balance • Beaker, Flask and other glassware as per requirement Atomic Absorption Instrument
10	Size Range (CI 9)	Different sizes of sieves

ANNEX 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 purpose of this scheme, material of one cast/ melt representing one furnace heat/ one tap of continuous furnace/ladle or holding furnace shall constitute one 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.

1.3 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.

2.3 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.

2.4 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.

2.4.2 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.

2.5 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.

2.5.2 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.

2.6 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 Molybdenum, 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 1469:1993, 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

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
8	Chemical Composition						
	Mo	8.1 to 8.4, Table 1	IS 1469	R	One	Each Control Unit	
	C		IS 12614 (Part 1 to 7) or any other established instrumental/ chemical method.	R	One	Each Control Unit	
	Si		R	One	Each Control Unit		
	S		R	One	Each Control Unit		
	P		R	One	Each Control Unit		
	Cu		R	One	Each Control Unit		
	Al		R	One	Each Control Unit		
	Pb		R	One	Each Control Unit		
	Sn		R	One	Each Control Unit		
9	Size Range	9.1,9.2	IS 1469	R	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard or as agreed between the manufacturer and purchaser. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
10	Extraneous Contamination	10	IS 1469	R	Firm shall exercise adequate in-process controls to ensure that the material remains free from extraneous contaminations like slag and non-metallic inclusions, etc.		

Annexure-I
XYZ FERRO ALLOY COMPANY
 (Registered office Address and works address)
TEST CERTIFICATE FOR FERROMOLYBDENUM

TEST CERTIFICATE No. _____

DATE _____

To M/s _____

We certified that the material described below fully conforms to IS 1469:1993 Chemical composition and Physical properties of the product,
 as tested in accordance with the Scheme of Inspection and Testing contained in the BIS Certification Marks Licence No.

CM/L _____ are as indicated below against each order No.

(PLEASE REFER TO IS 1469:1993 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

Test Results

Order No and Date	Size Designation	Control Unit No.	Grade Designation	Quantity (MT)	Chemical Composition									Extraneous Contamination
					Mo	C	Si	S	P	Cu	Al	Pb	Sn	

REMARKS
 WAGON NO
 TRUCK NO

FOR XYZ FERRO ALLOY COMPANY

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