

**PRODUCT MANUAL FOR
Alloy Steel Billets, Blooms and Slabs for forgings for General Engineering Purposes
According to IS 4368:1967**

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.	Product	:	IS 4368:1967
	Title	:	Alloy Steel Billets, Blooms and Slabs for forgings for General Engineering Purposes
	No. of amendments	:	NIL
2.	Sampling Guidelines		
a)	Raw material	:	No specific requirement
b)	Grouping Guidelines	:	Please refer Annex – A
c)	Sample Size	:	Tests for dimensional and tolerances shall be carried out on the full billet, bloom and slab selected as sample. For chemical tests: pieces of 50 X 50 mm/50 g drillings (samples are to be drawn by discarding the Heat Affected Zone in case of gas cutting). For physical and other tests i.e. tensile test, hardness, hardenability, grain size, decarburization: 1 m x 3 pcs or prepared test specimen
3.	List of Test Equipment	:	Please refer Annex – B
4.	Scheme of Inspection and Testing	:	Please refer Annex –C
5.	Possible tests in a day	:	All physical and chemical tests
6.	Scope of the Licence :		
	Licence is granted to use Standard Mark as per IS 4368:1967 with the following scope:		
	Name of the product	Alloy Steel Billets, Blooms and Slabs for forgings for General Engineering Purposes	
	Alloy Designation	20Mn2 etc.	
	Delivery condition	As rolled/forged/normalized/annealed	

ANNEXURE A
PRODUCT MANUAL FOR
Alloy Steel Billets, Blooms and Slabs for forgings for General Engineering Purposes
According to IS 4368:1967

GROUPING GUIDELINES

One sample may be drawn and tested from each grade as per Table 1 of IS 4368:1967 for chemical and hardness tests, to cover all the sizes of that grade. The sample may be in any delivery condition i.e. annealed/ normalized/ as-rolled/ forged.

In case a manufacturer applies for GOL/Inclusion of more than one product type (Billet, Bloom or slab) for the same designation, one sample of any type and any nominal size can be drawn and tested.

It shall, however, be ensured that the applicant/licensee has got complete manufacturing as well as testing facilities for the types/sizes/grades/delivery conditions required to be covered in the licence.

During the operation of license, it shall be ensured that all varieties covered in the license are drawn for independent testing on rotation over a period of time.

ANNEXURE B
PRODUCT MANUAL FOR
Alloy Steel Billets, Blooms and Slabs for forgings for General Engineering Purposes
According to IS 4368:1967

LIST OF TEST EQUIPMENT

Major test equipment required to test as per requirements of Indian Standard.

Sr. No.	Test Equipment	Tests used in with Clause Reference
1)	Device for instrumental chemical analysis such as Optical Spectrometer with all requisite channels, certified reference materials etc. OR Equipment, Apparatus and reagents as per as per the relevant parts of IS 228 in case of analysis as per IS 228 (PI See Annexure)	Chemical composition, Cl. 6
2)	Universal Testing Machine (UTM) as per IS 1608(Pt.1), class 1 accuracy or better.	Tensile Test, Cl 11.5.1
3)	Brinell Hardness Testing machine with indenter and measuring device as per IS 1500 (Pt.1) OR, Rockwell Hardness testing machine with spheroconical diamond indenter and tungsten carbide composite ball indenter as per IS 1586 (Pt.1)	Hardness test, Cl 11.5
4)	i) Vernier caliper gauge or any other suitable device ii) Steel scale iii) Micrometer (screw) gauge or other suitable device iv) Feeler gauges, Go/No-Go gauges, Radius Gauges v) Spirit Level and horizontal flat surface	Dimensions, Cl 8
5)	Unit having Quenching fixtures, arrangement for keeping specimen in place wait water jet emerging from cone at the bottom to touch the lower end of the sample. Muffle furnace, safety equipment, Rockwell hardness tester. (As per IS 3748)	Hardenability, Cl 9.3
6)	Laboratory Furnace, Metallographic Sample Preparation Equipment, Etching Reagent(either natal or picral), Metallurgical Microscope, Microhardness tester (Vickers/Knoop/Rockwell superficial) (As per IS 4748, IS 6396)	Grain Size, Cl 9.1 (f) and Depth of Decarburization, Cl 11.4
7)	Weighbridge, Platform balance or any other suitable instrument	Weight, Cl 8.3

Note 1: The list above is meant for guidance and may not be taken as exhaustive.

Note 2: The least count/accuracy, range and specification of the apparatus, chemicals and reagents used shall be as per the Indian Standard specifications.

ANNEXURE TO LIST OF TEST EQUIPMENT

INDICATIVE LIST OF TEST APPARATUS, CHEMICALS AND REAGENTS FOR CHEMICAL ANALYSIS THROUGH CHEMICAL METHODS AS PER IS 228

1.	Strohlein or Leco apparatus with all attachments Barometer with chart, Hot plate, Muffle furnace, Complete range of glass wares, measuring cylinders, Desiccator, porcelain boats or ceramic crucibles, Thermometer, Electronic Balance, Distilled Water, Hot air oven, Oxygen - 99.5 percent minimum purity, ether or acetone Standard Reference Material (NML) with certificate Reagents for C: tin granules or pure iron fillings, acidulated water/brine water, methyl red, caustic potash Reagents for S: Ceramic boats/crucibles – desiccators, Fluxes -Low sulphur copper, tin or iron, Dilute hydrochloric acid, Starch Iodide solution, Potassium iodate	C & S (chemical method, alternative to instrumental method)
2.	Weighing balance, Heater/ Heating element along with energy regulator, Ice water bath, Vol Flask Cap – 1 litre, (Whatman) filter paper No. 040, Suction Filtration Facility, Filter paper pulp pad, Standard Reference Material (NML) with certificate, Potassium Permanganate (KMnO ₄), Sodium Nitrite (Na ₂ NO ₃), Ammonium Molybdate [(NH ₄) ₂ Mo ₂ O ₇], Ammonium Phosphate [(NH ₄) ₃ PO ₄], Potassium Nitrate (K ₂ NO ₃), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO ₄), Sulphurous Acid, Hydrobromic Acid (HBr), other chemicals and reagent as applicable	Phosphorus content (chemical method, alternative to instrumental method)
3.	Hot plate, Conical flask Reagents: silver nitrate, ammonium persulphate sodium arsenite solution, Dilute Nitric Acid, Phosphoric Acid, Dilute Sulphuric Acid, Concentrated Nitric Acid, NaCl Solution, Permanganic acid	Manganese content (chemical method, alternative to instrumental method)
4.	Medium textured filter paper, Porcelain casserole, platinum crucible, filter paper pulp, hot plate, hot air oven, muffle furnace Reagents: Silver nitrate solution, concentrated nitric acid, concentrated sulphuric acid, Dilute Hydrochloric Acid, Dilute Sulphuric Acid, Perchloric Acid, Tartaric acid and hydrofluoric acid	Silicon content (chemical method, alternative to instrumental method)
5.	Plate, Muffle Furnace, porcelain or silica crucible, Reagents: Hot Wash Solution (dilute sulphuric acid solution 1 : 99 v/v with hydrogen sulphide), dilute sulphuric acid, hydrogen sulphide, Dilute Nitric Acid, Sodium Fluoride, solid, Dilute Ammonium Hydroxide, Acetic Acid, Potassium Iodide, Starch Solution, Sodium Thiosulphate Solution, Ammonium Bifluoride Solution	Cu content (chemical method, alternative to instrumental method)
6.	ashless paper pulp, paper pulp pad, hot plate, dessicator,	Ni content (chemical method, alternative to

	Reagents: ammonium nitrate, methyl red, dilute ammonium hydroxide, Concentrated hydrochloric acid Concentrated nitric acid, Perchloric acid, Hydrofluoric Acid	instrumental method)
7.	Hot plate, stop watch Reagents: dilute sulphuric acid and phosphoric acid mixture, concentrated nitric acid, ammonium persulphate, silver nitrate, dilute hydrochloric acid, ferrous ammonium sulphate, standard potassium permanganate solution.	Cr content (chemical method, alternative to instrumental method)

ANNEXURE C
PRODUCT MANUAL FOR
Alloy Steel Billets, Blooms and Slabs for forgings for General Engineering Purposes
According to IS 4368:1967

SCHEME OF INSPECTION AND TESTING

1.LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipments.

2. TEST RECORDS –The manufacturer shall maintain test records for the tests carried out to establish conformity.

3.PACKING AND MARKING– The Standard Mark, as given in the Schedule of the licence, shall be incorporated, provided always that material so marked conform to requirements of the specification.

3.1 Marking shall be done as per the provisions of the Indian Standard. In addition, the following shall be incorporated on the billet/bloom/slab or a label affixed thereto:

- i) BIS Licence Number CM/L—and
- ii) BIS website details i.e. “For details of BIS certification please visit www.bis.gov.in”

4. CONTROL UNIT – For the purpose of this scheme, material or part thereof representing all alloy steel billets, blooms and slabs of the same cast, designation and manufactured under uniform conditions of production in the same place shall constitute a control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

5.1 All the production which conforms to the Indian Standards and covered by the licence should be marked with Standard Mark.

5.2. **TEST CERTIFICATE** – If so desired by the purchaser, for each consignment of BIS certified material conforming to IS 4368:1967, test certificate may be issued which shall contain the Standard Mark, cast/control unit number, type, designation and corresponding test results as given in Annex 1.

6. REJECTIONS–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. 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. Any rejected material which is potentially resalable be sheared or cut or deformed in such a manner that it cannot be used for any other purpose. A separate record shall be maintained giving information on quantity and batch number/control unit number, as applicable, relating to all such rejections/defective/substandard material of the production not conforming to the requirements of the Specification and the method of its disposal. Such material shall in no case be stored together with that conforming to the Specification. The Standard Mark (if already applied) on rejected material should be defaced.

**TABLE 1
LEVELS OF CONTROL**

(Para 5 of Scheme of Inspection and Testing)

(1)			(2)		(3)		
Test Details			Test equipment requirement		Levels of Control		
Cl.	Requirement	Test Methods Clause Reference	R: required (or) S: Sub-contracting permitted		No. of Sample	Frequency	Remarks
6.0	noitisopmoC lacimehC						
	Ladle analysis	.IC 6.1 6.1.1 & 6.1.2 elbaT 1	SI 4368	R	1	Each cast	
	Check analysis	Table 1 and Table 2	SI 4368	R	1	Each cast	Sample shall be taken midway between the centre and outside of the material
Chemical composition shall be determined either by method specified in IS 228 or any other established instr/Chem.Method.							
5.0	Freedom from defect	CI 5.1, 5.2 and 5.3	IS 4368	R	Adequate inspection of each item to ensure freedom from defects		
8.1	Dimension and tolerance	8.1, 8.1.1, 8.2, 8.2.1, 8.3	IS 4368 IS 3469 & IS 1852	R	Adequate inspection and testing to ensure dimensions are within specified tolerances		
9.2	Hardness	9.2 and table 1	IS 4368	R	1	Every 10 tonnes or part thereof for Each control unit	
9.3	Hardenability	9.3	IS 4368	S	As agreed between manufacturer and purchaser		To be done when material is ordered on the basis of hardenability
9.4	Mechanical properties	9.4	IS 4368 and IS	S	As agreed between manufacturer and purchaser		To be done when material is ordered on the basis of mechanical properties

			1570			
11.3	Grain size	11.3	IS 4368	S	As agreed between manufacturer and purchaser	To be done when material is ordered on the basis of grain size
11.4	Depth of Decarburization	11.4	IS 4368	S	As agreed between manufacturer and purchaser	To be done when material is ordered on the basis of depth of decarburization
11.6	Additional test	11.6	IS 4368	S	As agreed between manufacturer and purchaser	Optional tests such as metallographic test, NDT, macro test or any other special test

Note-1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-2: The control unit and levels of control as decided by the Bureau are obligatory to which the licensee shall comply with.



PM/ IS 4368/ 1
July 2019

Annexure 1
Para 5.2 of Scheme of Inspection and Testing

Company XYZ

Test Certificate for Alloy Steel Billets, Blooms and Slabs for Forging for General Engineering Purpose

Test Certificate No _____ -

Date :

We certify that the material described below fully conforms to IS 4368:1967. Chemical composition, physical and other 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 4368:1967 FOR DETAILS OF SPECIFICATION REQUIREMENTS}

STLUSER TSET

O dr re N .o	S i z e	Des ign atio n	Deliv ery cond ition/ Basi s of order	C or ner radi us	H e at N o	B at ch N o	uQ tial y T) no en (s	noitisopmoc lacimehC										Har dne s	eT isn el rtS ne tg h	oE gn oita n	G r ia n is z e	eR am skr
								C) % (S) % (M) % (S) % (P) % (N) % (C) % (M) % (V) % (A .l) % (

Jominy Hardenability

Distance																			
Minimum (HRC)																			
Maximum (HRC)																			
Actual (HRC)																			

skrameR-----

Remarks

REMARKS

SHIPPING ADVICE NO/WAGON NO.

FOR XYZ IRON AND STEEL COMPANY



PM/ IS 4368/ 1
July 2019

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