



उत्पाद मानुयल
Alloy steel forgings for general industrial use
IS 4367:1991 के अनुसार

PRODUCT MANUAL FOR
Alloy steel forgings for general industrial use -
According to IS 4367:1991

भारतीय मानक ब्यूरो)अनुरूपता मूल्यांकन (विनियम की स्कीम-I के तहत यह उत्पाद मानुयल प्रमाणीकरणके प्रचलन मे रीति और पारदर्शिता के सुसंगता सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों एवं लाइसेन्स धारियों द्वारा संदर्भ सामग्री के रूप मे उपयोग किया जाएगा। बीआईएस लाइसेन्स/प्रमाण पत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज़ का उपयोग 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.	उत्पाद Product	:	IS 4367:1991
	शीर्षक Title	:	Alloy steel forgings for general industrial use
	संशोधन संख्या No. of amendments	:	2
2.	नमूनाकरण दिशा निर्देश Sampling Guidelines		
a)	कच्चा माल Raw material	:	No specific raw material requirement
b)	समूहिकरण दिशा निर्देश Grouping Guidelines	:	NA(Sample of each designation shall be drawn and tested)
c)	नमूने का परिमाण Sample Size	:	Dia 125 mm x500 mm length cut piece from final steel forging .for Physical test: (preparation for 1pc for Tensile Test and 3 pc for Impact Test, I pc for hardness test and 1 pc for other tests cl.10,11 and 12 of ISS.and one pc/ 70 g drilling chemical test).

e)	Guidelines for surveillance		No market samples to be drawn since product is bulky. Feedback to be obtained from users.
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please refer Annex - A
4.	निरीक्षण व परीक्षण स्कीम Scheme of Inspection and Testing	:	Please refer Annex - B
5.	एक दिन में संभावित परीक्षण Possible tests in a day	:	All tests are possible to be carried out in a day
6.	लाइसेन्स का कार्यक्षेत्र / Scope of the Licence :		
	IS 4367:1991 के अनुसार मानक मुहर का उपयोग करने के लिए लाइसेन्स निम्नलिखित कार्यक्षेत्र के लिए प्रदान किया जाता है Licence is granted to use Standard Mark as per IS 4367:1991 with the following scope:		
	Name of the product	Alloy steel forgings for general industrial use	
	Designation	20C15, 15Cr3, etc...	

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

ANNEXURE A
TO PRODUCT MANUAL FOR
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LIST OF TEST EQUIPMENTS

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

Sl. No.	Test Equipment/Chemicals and Identification Numbers (Where applicable)	Tests Used in with Clause Reference
	For Mechanical properties and Microstructure	
1.	Universal testing machine (UTM), Extensometer ,digital vernier caliper/ vernier caliper External micrometer , Cutting Machine	Tensile test , Cl.9.2. (Table 3)
2.	Izod Or Charpy Impact Testing M/C , Profile Projector Radical Cutting Machine , Bench Grinder , Notch Cutting Machine squarness checking gauge (Plunger dial gauge lateral expansion gauge (Plunger dial gauge)	Impact Test Cl.9.4 (Table 3)
3.	Brinell Or Rockwell Hardness Tester With Standard Test Blocks	Hardness Test Cl.9.3.1 (Table 3, colum 8)
4.	Microscope (100 X min. magnification), Standard Diagrams as per IS 4163:2021	Inclusion rating, Cl 11
5.	Microscope (100 X min. magnification), etchants, standard charts (if required) and materials as per IS 4748:2009	Grain Size, Cl 12
	For chemical tests	
5.	Device for instrumental chemical analysis such as Spark Optical Emission Spectrometer, Atomic Absorption Spectrometer etc. with all requisite channels, certified reference materials/standard reference materials OR Equipment, Apparatus and reagents as per the relevant parts of IS 228 in case of analysis as per IS 228 (chemical method)	Chemical composition ,Cl 7(table-1,2) (C,Si,Mn, Ni,Cr,Mo,V,S,P)

6.	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 - cl.7(table-1& 2). (chemical method, alternative to instrumental method)
8.	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 cl.7(table-1& 2). (chemical method, alternative to instrumental method)
9.	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 cl.7(table-1& 2). (chemical method, alternative to instrumental method)
10.	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 cl.7(table-1& 2). (chemical method, alternative to instrumental method)
11.	Hot Plate, Reagents: distilled water, Acid Mixture (700 ml of perchloric acid (rd=1.67), Phosphoric acid (rd=1.70) and Nitric Acid (rd=1.42), Concentrated Hydrochloric Acid (rd=1.16), Dilute sulphuric Acid 1:1 and 1:5, Potassium Thiocyanate solution, 100g/Ltr, Stannous Chloride Solution, N-Butyl Acetate, Iron Molybdenum Free (Mo<0.001 percent), Standard Molybdenum solution (1 ml=0.01 mg Mo)	Mo content cl.7(table-1& 2). (chemical method, alternative to instrumental method)

12	ashless paper pulp, paper pulp pad, hot plate, dessicator, Reagents: ammonium nitrate, methyl red, dilute ammonium hydroxide, Concentrated hydrochloric acid Concentrated nitric acid, Perchloric acid, Hydrofluoric Acid	Ni Content (chemical method, alternative to instrumental method)
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Note 1: The above is an indicative list for the purpose of guidance only and may not be treated as exhaustive

ANNEXURE C
TO PRODUCT MANUAL FOR
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SCHEME OF INSPECTION AND TESTING

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. LABELLING, MARKING, PACKING - The Standard Mark as given in schedule of the licence and Licence Number (i.e. CM/L ..) shall be incorporated **on the test certificate (see 6) accompanying each consignment of forgings**, and the marking and packing shall be done as per the provisions of the Indian Standard, provided always that the product thus marked conform to all the requirements of the specification.

4. CONTROL UNIT - For the purpose of this scheme material or part thereof representing all forgings of the same cast, grade and manufactured under uniform conditions of production 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.

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

6. TEST CERTIFICATE - For each consignment of BIS Certified material conforming to IS **4367:1991** there shall be a test certificate which shall contain the Standard Mark, the cast/Control Unit number and the corresponding test results (as given in Annexure-I enclosed)

7. 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. Any rejected material which is potentially re-salable be sheared or cut or deformed in such a manner that it cannot be used for any other purpose except re-melting. A separate record shall be maintained giving information on quantity and cast number/control unit number, as applicable, relating to all such rejections/defective/sub-standard 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.

ANNEXURE C
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SCHEME OF INSPECTION AND TESTING

TABLE 1: LEVELS OF CONTROL

(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				
4	Manufacture	4.1 to 4.4	IS 4367	R	-----	-----	Applicable for all manufacturers including: i) manufacturers with steel making facilities i i) Manufacturers producing forgings from Ingots as raw material: Must ensure that Ingots procured by them comply with Cl 4.1 to 4.4 of IS 4367:1991. Accordingly, records in support of the same shall be maintained which shall include raw material certificate indicating steel manufacturing process, freedom from defects etc.
5	Freedom from defects	5.1 to 5.4	IS 4367	R	--	Adequate inspection	
6	Tolerances	6.1	IS 3469 (Parts 1 to 3)	R	--	Adequate inspection	
7	Chemical Composition						
7.1	Ladle Analysis	Cl.7.1 & Table 1	IS 4367	R	One	Each Heat	Applicable only for manufacturers with steel making facilities
7.2	Check Analysis	Cl .7.1 Table- 1 and 2	-do-	R	One	Each Heat	Sample shall be taken as per Cl 8 of IS 4367
9	Mechanical	Cl. 9	(IS 4367)	R	One	Each control	Any of the original test pieces fail to pass

	Properties (a) Tensile Test (b) Hardness Test (c) Impact Test	and Table 3	(IS 1608) (IS 1500) (IS 1598)			unit	the mechanical test as specified in clause 9 to further test sample selected for Re-test of each test sample that failed as per Cl.14 of IS 4367
10	Macrostructure	Cl.10	IS 4367	R	One	Each control unit	
11	Inclusion Rating	Cl. 11	IS 4367 IS 4163	R	One	-do-	
12	Grain Size	Cl. 12	IS 4367	R	One	-do-	
13	Additional Tests (optional)	Cl. 13	IS 4367	S	As agreed between purchaser and supplier		

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.

ANNEXURE I

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(Para 6 of the Scheme of Inspection and Testing)

XYZ IRON AND STEEL COMPANY

(Registered office Address and works address)

TEST CERTIFICATE FOR Alloy steel forgings for general Industrial use

BIS
STANDA
RD
MARK

TEST CERTIFICATE No. _____

DATE _____

To M/s _____

We certified that the material described below fully conforms to IS 4367:1991 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 4367:1991 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	Size	Control Unit No.	Grade	Quantity in MT	CHEMICAL COMPOSITION								MECHANICAL PROPERTIES					Ultrasonic testing	Hardness	Remarks
					C %	Si %	Mn %	Ni %	Cr %	Mo %	V %	S %	P %	TS	%El	Yield Strength	Condition	Impact Test (izod)		

REMARKS

WAGON

NO.

TRUCK NO.

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

FOR XYZ IRON AND STEEL COMPANY