



**उत्पाद मानुयल  
पिस्टन पिनस (गजन पिनस) के लिए इस्पात  
IS 11952:1986 के अनुसार**

**PRODUCT MANUAL FOR  
Steels for Piston Pins (Gudgeon Pins)  
According to IS 11952:1986**

भारतीय मानक ब्यूरो) अनुरूपता मूल्यांकन (विनियम की स्कीम-I के तहत यह उत्पाद मानुयल प्रमाणीकरण के प्रचलन में रीति और पारदर्शिता के सुसंगत सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों एवं लाइसेंस धारियों द्वारा संदर्भ सामग्री के रूप में उपयोग किया जाएगा। बीआईएस लाइसेंस/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.	<b>उत्पाद Product</b>	:	IS 11952:1986
	<b>शीर्षक Title</b>	:	पिस्टन पिनस (गजन पिनस) के लिए इस्पात Steels for Piston Pins (Gudgeon Pins)
	<b>संशोधन संख्या No. of amendments</b>	:	1
2.	<b>नमुनाकरण दिशा निर्देश Sampling Guidelines</b>		
a)	<b>कच्चा माल Raw material</b>	:	कोई विशेष आवश्यकता नहीं No Specific requirement
b)	<b>समूहिकरण दिशा निर्देश Grouping Guidelines</b>	:	कृपया Annex-A देखें Please see Annex-A
c)	<b>नमूने का परिमाण Sample Size</b>	:	For Chemical tests: i) For instrumental chemical analysis- 5 pieces of 5cm ii) For Wet Chemical analysis - 50 gm drilling For mechanical tests- 3 Nos. x 1.0 Meter

3.	<b>परीक्षण उपकरणों की सूची</b> <b>List of Test Equipment</b>	:	कृपया Annex-B देखें Please refer Annex –B
4.	<b>निरीक्षण व परीक्षण स्कीम</b> <b>Scheme of Inspection and Testing</b>	:	कृपया Annex-C देखें Please refer Annex - C
5.	<b>एक दिन में संभावित परीक्षण</b> <b>Possible tests in a day</b>	:	सभी परीक्षण All tests
6.	<b>लाइसेन्स का कार्यक्षेत्र/Scope of the Licence :</b>		
	IS 11952:1986 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 11952:1986 with the following scope:		
	<b>उत्पाद का नाम</b> <b>Name of the product</b>	Steels for Piston Pins (Gudgeon Pins)	
	<b>Grade Designation</b>	As per Table 1	
	<b>Condition of Delivery</b>	Hotrolled/Turned/Centerless / Peeled	
	<b>Size</b>	As per manufacturing facilities	

ANNEXURE A

**GROUPING GUIDELINES for**  
**STEEL FOR PISTON PINS**  
**(GUDGEON PINS) as per IS**  
**11952:1998**

Grade Designation	C15, 15Cr3, 15Cr6Ni6, 16Mn5Cr4, 14Mn4, 18Cr3, 15Ni13Cr3MO2, 15Ni5Cr4MO1, 15Cr4, 15CrMO3, 20Ni2Cr2MO2, 15C4-BT
Condition of delivery	hotrolled/turned/centerless / peeled

1. One sample may be drawn and tested from each Designation and each delivery condition to cover all the sizes of that grade.
2. However, it shall be ensured that the firm is having all the necessary manufacturing and testing facilities for the manufacture and testing of the varieties of steel bars to be covered in the scope of license.
3. During the operation of license, BO shall ensure that all the varieties covered in the license are drawn for independent testing on rotation over a period of time.

## ANNEXURE B

### LIST OF TESTING EQUIPMENT for STEEL FOR PISTON PINS (GUDGEON PINS) as per IS 11952: 1998

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

Sr . No	Test Equipment/Chemicals	Tests Used in with Clause Reference
1	Rough Polishing Machine, Abrasive Cutting Machine, Fine Polishing Machine, Grinding Machine, Molding machine, Longitudinal cutting machine, Diamond Paste	Preparation of specimen
2	Vision-based inspection system MPI machine, UV light, centrifuge tube	Magnetic Particle test (Cl.7), Surface Defects (cl.10)
3	<b>Instrumental methods</b> Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry, Standard Reference Material with certificate  <b>Chemical methods</b> Laboratory reagents and apparatus as per parts of IS 228 (indicative list enclosed)	Chemical Composition Clause - 4 for C, Si, Mn, Ni, Cr, Mo, Ti, V, S, P, N, Cu, B, Nb,
4	Brinell Hardness Tester of suitable Range preferably 300 BHN or more with Standard Reference Blocks of Thickness 6mm, 12mm and 16mm. Conditioning Facilities - control the temperature within a range, such as 23 °C ± 5 °C.	Hardness, Clause 5.2
5	Tensile Testing Machine of suitable range fitted with extensometer	Mechanical Properties, Clause 5.1
6	Metallurgical Microscope of suitable magnification (100x) polishing machine, Polishing paper, velvet cloth, Diamond compound, Muffle furnace, Nitric acid, alcohol	Inclusion Rating (Cl. 6) Grain Size (cl 8.1)
7	Muffle furnace, mild steel vessel (as per fig 4 of IS 3848), graphite plate/cast iron shot, Hardening apparatus (as per fig 2 of IS 3848), Rockwell hardness tester, Vickers hardness tester, nitric acid , hydrochloric acid, coolant/cold water, Vernier caliper, stop watch	Hardenability (cl.9)
8	Vernier Calipers, Micrometer, Scale, Cord, Measuring Tape, Straight Edge, spirit level	Dimensions and Dimensional Tolerances

	bench, surface plate	(cl.11)
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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.

## APPARATUS, CHEMICALS AND REAGENTS FOR CHEMICAL ANALYSIS THROUGH CHEMICAL METHODS

1.	Strohlein or Leco apparatus with all attachments Barometer with chart, Hot plate, Muffle furnace, Complete range of glass wares, measuring cylinders, Desiccators, 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 <sub>4</sub> ), Sodium Nitrite (Na <sub>2</sub> NO <sub>3</sub> ), Ammonium Molybdate [(NH <sub>4</sub> ) <sub>2</sub> Mo <sub>2</sub> O <sub>7</sub> ], Ammonium Phosphate [(NH <sub>4</sub> ) <sub>3</sub> PO <sub>4</sub> ], Potassium Nitrate (K <sub>2</sub> NO <sub>3</sub> ), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO <sub>4</sub> ), 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, desiccators, 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)

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, and standard potassium permanganate solution.	Cr content (chemical method, alternative to instrumental method)
8.	Reagents: Perchloric Acid, Phosphoric Acid, Nitric Acid, Hydrochloric Acid, Dilute sulphuric acid, potassium thiocyanate solution, stannous chloride solution, n-butyl acetate, Iron-Mo free, molybdenum metal (99.9 pc pure)  Spectrophotometer, Volumetric flask, conical flask, titration apparatus (burette, pipette etc.), hot plate, thermometer, separating funnel, dry filter paper and other laboratory glassware and apparatus	Mo content  <b>Ja</b> <b>n</b> (for determination of Mo by thiocyanate (photometric method) method in low and high alloy steels for Mo 0.01 to 1.50 percent) as per IS 228 Part 10
9.	Reagents: Dilute sulphuric acid, conc nitric acid, hydrofluoric acid, boric acid solution, potassium bisulphite, ferrous sulphate solution, Alpha-Bentoinoxime Solution, Bromine Water, Sulphuric Acid-Benzoinoxime Wash Solution, Dilute Ammonium Hydroxide Solution, Concentrated Hydrochloric Acid, Dilute Hydrochloric Acid, Tartaric Acid, solid, Hydrogen Sulphide, gas, Hydrogen sulphide Wash Solution, Cinchonine Solution  Platinum crucible, Volumetric flask, conical flask, titration apparatus (burette, pipette etc.), hot plate, thermometer, separating funnel, ashless filter paper and other laboratory glassware and apparatus	Mo content (for determination of Mo by Alpha-benzoinoxime method in alloy steels for Mo > 1 percent and not containing Tungsten)

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 C**

### **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.

The manufacturer shall prepare a calibration plan for the test equipment.

**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 on each bundle of the material or on a metal tag affixed to each bundle, provided always that material so marked conform to requirements of the specification.

Marking shall be done as per the provisions of the Indian Standard. In addition, the following shall be incorporated on each bundle of steel bars or the metal tag 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](http://www.bis.gov.in)”

**3. CONTROL UNIT** – For the purpose of this Scheme, a control unit is defined as material of same cast, finish, condition and shape and processed to same dimensions under uniform conditions of production.

**4. 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.

**5. TEST CERTIFICATE**—For each consignment of BIS Certified material conforming to IS 11952:1986 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)

**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**

(1)				(2)	(3)		
Test Details				Test equipment requirement R:required (or)S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
3	Manufacture	3.1	IS 11952:1986	R	Each Bar	Each Bar	If found defective, item shall be rejected and not be marked.
4	Chemical Composition	Any established instrumental/chemical method. However, records of referee method as agreed to between manufacturer and purchaser shall be maintained.					
	Ladle Analysis	Cl.4.1, Table-1	IS 11952:1986	R	One	Each Heat	Applicable for manufacturers with steel making facilities only
	Check analysis	Cl.4.2, cl.4.3 Table-1,2	IS 11952:1986	R	NIL	NIL	Applicable for manufacturers with steel making facilities only
		Cl.4.2, cl.4.3 Table-1,2	IS 11952:1986	S	One	Each Cast	Applicable for Re-rollers/drawing units. See Note-3

5	Mechanical Properties						
	Tensile Strength	Cl.4.1, Table- 3	IS 1608(Pt.1)	R	one	Every control unit	
	Hardness Test	Cl.4.2, Table- 3	IS1500	R	One	Every control unit	
6	Inclusions	6.1	IS 4163	R	One	Every control unit	
7	Magnetic particle test	7.1, 7.2	IS 11952:1986	R	One	Every control unit	
8	Grain Size	8.1	IS 2853	R	One	Every control unit	
9.	Hardenability	9.1	IS 3848	R	One	Every control unit	

10	Surface defects	10.1	IS 11952	R	Adequate inspection		
11	Dimensional Tolerances	cl. 11.1, 11.1.1, 11.1.2	IS 11952	R	10 % of production	Every control unit	

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.

Note-3: No testing is required if the material is ISI marked and received with test certificate

**Annexure-I**

(Para 5 of the Scheme of Inspection and Testing)

Company Name

(Registered office Address and works address)

BIS  
STANDARD  
MARK

**TEST CERTIFICATE**

**FOR STEEL FOR VALVES FOR PISTON PINS (GUDGEON PINS)**

TEST CERTIFICATE No. \_\_\_\_\_

DATE \_\_\_\_\_

To M/s \_\_\_\_\_

We certified that the material described below fully conforms to IS 11952:1986 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 \_\_\_\_\_ areas indicated below against each order No.

(PLEASE REFER TO IS 7494:1981 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

**TEST RESULTS**

Order no and date	Size/Shape /Type	Designation/ Condition	Cast	Quantity	Chemical Composition											Mechanical Properties <sup>#</sup>		Inclusion rating and grain size	Hardenability	Surface defects
					C	Si	Mn	Ni	Cr	Mo	Ti	V	S	P	N	Others	TS (Mpa)	Hardness		

<sup>#</sup> if required by purchaser

REMARKS

WAGON NO.

TRUCK NO.

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

FOR \_\_\_\_\_ COMPANY Name