

**PRODUCT MANUAL FOR  
SPECIFICATION FOR HEAT RESISTING STEELS  
According to IS 9516 : 1980**

*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.*

1.	<b>Product</b>	:	<b>IS 9516 : 1980</b>
	<b>Title</b>	:	<b>HEAT RESISTING STEELS</b>
	<b>No. of Amendments</b>	:	2
2.	<b>Sampling Guidelines:</b>		
a)	<b>Raw material</b>	:	No specific requirement
b)	<b>Grouping guidelines</b>	:	Please refer ANNEXURE –A
c)	<b>Sample Size</b>	:	2 x 1m + 100 gm drillings
3.	<b>List of Test Equipment</b>	:	Please refer ANNEXURE –B
4.	<b>Scheme of Inspection and Testing</b>	:	Please refer ANNEXURE –C
5.	<b>Possible tests in a day</b>	:	All physical and chemical tests
6.	<b>Scope of the Licence :</b>		
	Licence is granted to use Standard Mark as per IS 9516: 1980 with the following scope		
	Name of the product	<b>HEAT RESISTING STEELS</b>	
	Steel Designation	X 15 Cr 25 N/ X15Cr 24Ni13 /X20 Cr 25Ni20	
	Product Type	Plates, Sheets/Strips, Tubes, Bars, Forgings, Wire	
	Process	<b>Hot Worked, cold worked, etc..</b>	
	Heat Treatment	Annealed/ Quenched	
	Thickness	Plates, sheets, from .....mm to.....mm Strips, from .....mm to.....mm Tubes, from .....mm to.....mm Bars, from .....mm to.....mm Forgings, from .....mm to.....mm Wire, from .....mm to.....mm	
	Class	Class1/Class2/Class3	

**ANNEXURE A**

1. Grouping of Heat Resisting Steels is carried out on the basis of method of manufacture and strength as under:
  - a) Steel Designation (Ferritic/Austenitic)
  - b) Form (Plate, sheet, strip, tubes, bars, forgings, Wires)
  - c) Class (1,2,3)
  - d) Process (hot work/cold work/seamless/welded/forged/drawn)
  - e) Heat Treatment

2. Accordingly, for the purpose of the GOL/CSoL the product is grouped as under:

Group	Steel Grade	Form	Work Condition	Remarks
1	X15Cr25N (Ferritic)	Plates	Hot worked	One sample from the group of each form for a given work condition and of any size shall be drawn and tested for considering GoL/CSoL.
		Sheet & Strip	Hot worked	
			Cold worked	If above sample drawn is of class-3, then GoL may be considered for class-1 also alongside class-3. In case the sample drawn is of class-2, GoL may be considered for class-1 also alongside class-2.
		Tubes	Seamless	
			Welded	
		bars	Hot worked	However, in case, manufacturer declares that material meets requirements of classes 2 & 3 then without insisting for two different samples of class - 2 & 3, one sample drawn can be tested for requirements of both the classes and GoL may be considered for all three classes.
		Forgings	Hot worked	
Wires	Cold drawn			
2	X15Cr 24Ni13 X20 Cr 25Ni20 (Austenitic)	Plates	Hot worked	One sample from the group of each form for a given work condition and of any size and any one steel designation shall be drawn and tested for considering GoL/CSoL.
		Sheet & Strip	Hot worked	
			Cold worked	If above sample drawn is of class-3, then GoL may be considered for class-1 also alongside class-3. In case the sample drawn is of class-2, GoL may be considered for class-1 also alongside class-2.
		Tubes	Seamless	
			Welded	
		bars	Hot worked	However, in case, manufacturer declares that material meets requirements of classes 2 & 3 then without insisting for two different samples of class - 2 & 3, one sample drawn can be tested for requirements of both the classes and GoL may be considered for all three classes.
		Forgings	Hot worked	
Wires	Cold drawn			

3. It shall, however, be ensured that the applicant/licensee has got complete manufacturing capabilities as well as testing facilities for the sizes/designations/forms required to be covered in the licence scope.
4. During the operation of license, BO shall ensure that all steel designations & forms covered in the license are drawn for independent testing on rotation over a period of time.

**ANNEX B**  
**List of Test Equipment**

*Major test equipment required to test as per the 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, lathe etc	Preparation of specimen for Chemical composition, tensile properties and hardness test (as per Figs 1, 2 and 3)
2.	<p><b><u>Analytical method</u></b></p> <p>(1) <b>Carbon &amp; Sulphur:</b> IS 228(P-I) Carbon –Sulphur (Strohlein’s type) apparatus-complete set(consisting of glass parts assembled on wooden stand, combustion furnace, thyristor based electronic control panel, Oxygen cylinder, Sulphur cup, combustion boats Barometer, Room temperature thermometer etc. Standard steel of appropriate values of carbon &amp; Sulphur.</p> <p>(2) <b>Silicon:</b> IS 228 (Part 8) Hydrochloric acid, Sulphuric acid, Nitric acid ,Silver Nitrate, Perchloric acid, Hydrofluoric acid, Weighing balance 200g, LC 0.1 mg, Muffle furnace up to 1100°C, Platinum Crucibles, Hot Plate, Porcelain dish 300ml, Filter paper pulp. Filter papers General lab glassware</p> <p>(3) <b>Manganese</b> IS 228 (Part 2): Sulphuric Acid, Concentrated .Nitric Acid -Relative density 1.42,Phosphoric Acid, Ammonium persulphate, Silver Nitrate, Sodium Chloride, Sodium carbonate, Sodium arsenite, Steel sample of known Manganese Content</p> <p>(4) <b>Nickel:</b> Cl 6,2 of 228(P-5): Hydrochloric Acid, Nitric Acid-, Perchloric Acid -, Tartaric Acid, Ammonium hydroxide, Dimethylglyoxime, Methyl Red , Ammonium Nitrate, Hydrofluoric Acid –Sintered glass crucible No. 3.</p> <p>(5) <b>Chromium</b> IS 228 (Part 6): Wide mouth conical Flask, glass beads, Phosphoric Acid, Sulphuric Acid, Concentrated Nitric Acid, Hydrochloric Acid -, Silver Nitrate, Ammonium Persulphate Solution, Ferrous Ammonium Sulphate, Ammonium persulphate, Potassium Permanganate (AR) Sodium Oxalate (GR )</p> <p>(6) <b>Phosphorus:</b> IS 228 (Part 3). Nitric Acidconc., Potassium Permanganate, ted Ammonium Hydroxide, Sodium Nitrite, ammonium molybdate , Phenolphthalein Solution ( 1% ),Sodium Hydroxide, Potassium hydroxide ,Potassium Nitrate, sodium carbonate, Hydrochloric Acid-, Hydrofluoric Acid, Perchloric Acid ferrous sulphate crystals ( FeSO<sub>4</sub>.7H<sub>2</sub>O ), Sulphurous Acid, Hydrobromic Acid -filter paper pulp pad.</p> <p>(7) <b>Nitrogen:</b> IS 228 (Part 19) APPARATUS FOR DETERMINATION OF NITROGEN B STEAM DISTILLATION (as per Fig 1 of IS 228 (Part 19) Nessler’s Reagent (potassium iodide,</p>	Chemical Composition (5)

	<p>mercuric chloride, potassium hydroxide) Potassium Sulphate, Crystals, Copper Sulphate Crystals, Sulphuric Acid rd=1.84, Barium Chloride, Mixed Indicator Solution (Bromocresol green, Methyl Red) Devarda's Alloy, (50 Cu, 5 Al, 5 Zn.), Boric Acid, Sodium Hydroxide-Tartaric Acid, Potassium acid phthalate Note: Availability of General lab equipment Balance 200g (LC =0.1 mg), Hot plates, Fuming chambers &amp; Glass ware i.e beakers, flasks, burette, pipettes, volumetric flask round bottom flask, funnels, Filter paper shall be insured during the visit.</p> <p><b>(8) Copper:</b> 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</p>	
3.	Instrumental Method - Optical Emission Spectrometer (OES) with requisite channels and certified reference materials	C, S, P, Mn, Si, Ni, Cu, Cr ,Mo Ti, V (5)
4.	Instrumental methods 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	C, S, P, Mn, Si, V, Cu, Cr, Ni, Ti, Mo (5)
5.	Vernier Callipers, Micrometer, Scale, Cord, Measuring Tape.	Dimensional Tolerance(7)
6 .	Tensile testing machine fitted with extensometer,	Tensile Properties(6.2)
7.	Brinell hardness test	Hardness( 6.1)

*The above list is indicative only and may not be treated as exhaustive.*

**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.

**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 Column (1) of the First Schedule of the license and Licence Number (i.e. CM/L.....) shall be incorporated, and the marking and packing shall be done as per the provisions of the Indian Standard, provided always that the product thus marked and packed conforms to all the requirement of the specification. In addition, stencilled content or label affixed on top of package shall also contain the phrase 'Please visit [www.bis.gov.in](http://www.bis.gov.in) for BIS certification details'.

**4. CONTROL UNIT** – For the purpose of this scheme the material or part thereof representing the same cast, condition and form processed to same nominal thickness under uniform conditions of production in a day 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** Steels covered by this standard shall be delivered in accordance with one of the requirement classes given in Table 1 of IS 9516:1980.

**5.3** General requirements relating to supply of material shall conform to IS 1387.

**6. TEST CERTIFICATE**- For each consignment of BIS Certified material conforming to IS 9516:1980 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. A separate record shall be maintained giving information on quantity and cast number/coil 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.

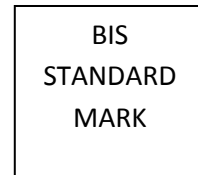
**TABLE 1**

(1)			(2)	(3)			
Test Details			Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control			
Cl.	Requirement	Test Method Clause      Reference		No. of Sample	Frequency	Remarks	
4	Freedom from Defects	4.1      IS 9516:1980	R	Each item	Each item		
5	Chemical Composition	IS 228 or any other established instrumental/chemical method					
	Ladle Analysis	5.1, 5.3 Table 4	IS 9516:1980	R	One	Each Heat	Applicable for manufacturers with steel making facilities only
	Product analysis	5.2, 5.3,9.1 Table 4 and 5	IS 9516:1980	R	NIL	NIL	Applicable for manufacturers with steel making facilities only
				S	One	Each Cast	Applicable for Re-rollers. See Note-3.
6	Mechanical Properties a) Hardness b) Tensile strength c) 0.2 Percent Proof stress d) Elongation %	6.1, 6.2 6.3, 8.2.2, 9.2 & Table 2	IS 9516:1980	R	One	Each Control Unit	
7	Dimensions and Tolerances	7.1      IS 9516:1980	R	Adequate inspection to ensure each item to be within the limits of specification			

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 empaneled 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 6 of the Scheme of Inspection and Testing)  
 XYZ COMPANY  
 (Registered office Address and works address)  
**TEST CERTIFICATE FOR HEAT RESISTING STEELS**

TEST CERTIFICATE No. \_\_\_\_\_  
 To M/s \_\_\_\_\_

DATE \_\_\_\_\_

We certified that the material described below fully conforms to IS 9516:1980 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 9516:1980 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

Test Results

Order No and Date	Form	Batch /Control Unit number	Quantity	Dimensions & Tolerances	Chemical Composition										Mechanical Properties		Optional requirements <sup>#</sup>	
					C	Si	Mn	Cr	S	P	Cu	Ni	Mo	V	Hardness	Tensile Properties		

<sup>#</sup> if agreed between

REMARKS  
 WAGON NO  
 TRUCK NO

FOR XYZ COMPANY

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