

**PRODUCT MANUAL FOR
BEAD WIRE FOR TYRES
According to IS 4824:2006**

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 4824:2006
	Title	:	Bead Wire for Tyres
	No. of amendments	:	0
2.	Sampling Guidelines		
a)	Raw material	:	Steel Shall be killed and subjected to nitrogen analysis occasionally. In case of wire drawing units using ISI marked wire rods for drawing wires, the wire rods generally conforms to IS 7904.
b)	Grouping Guidelines	:	Please refer Annex - A
c)	Sample Size	:	For mechanical tests: 15 No.s of 45cm length For chemical tests: 5 No.s of 45cm length
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 tests
6.	Scope of the Licence :		
	Licence is granted to use Standard Mark as per IS 4824:2006 with the following scope:		
	Name of the product	Bead Wire for Tyres	
	Nominal Size(in mm)	0.78,0.89,...	
	Finish	Bronze plated,..	

**ANNEXURE A
TO PRODUCT MANUAL FOR
BEAD WIRE FOR TYRES
According to IS 4824:2006**

GROUPING GUIDELINES

PAGE 1 OF 1

Grouping has been done on the basis of tensile strength, bend test and coating requirements as under:

Higher rank ↓	Group-1 (size in mm)	Group-2 (size in mm)
	0.78	2.49
	0.89	1.80(TS-1470 N/mm ²)
	0.965	1.83
		1.80(TS-1720 N/mm ²)

1. One sample of highest rank of a group of each finish applied for shall be tested for all the requirements for considering all the sizes in a group of the finish.
2. The test method used by the manufacturer for coating test as per cl.11 of IS 4824:2006, shall be reported.
3. During preliminary inspection, testing for adhesion test is to be carried out at factory premises, till the time an independent laboratory is recognized, for all the samples drawn as mentioned above.
4. If the sample passes, the licence/inclusion can be granted for all sizes and finishes mentioned in the specification and as applied by the applicant/licensee, provided that the firm is having all necessary manufacturing and testing facilities for manufacturing and testing of all other sizes and surface finishes of wires proposed to be included in the licence.
5. During the operation of licence, BO shall ensure that all the finishes and sizes of wires covered in the license are drawn for independent testing on rotation over a period of time.

ANNEXURE B
TO PRODUCT MANUAL FOR
BEAD WIRE FOR TYRES
According to IS 4824:2006

LIST OF TEST EQUIPMENTS

Page 1 of 2

Major test equipment 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
1.	<p>Instrumental methods Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry.</p> <p>Spectrophotometer</p>	<p>Chemical Composition Cl 6.1,6.2 for C,S, P, Mn, Si, Al, N</p> <p>Mn, S, P, Si</p>
2.	<p>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</p> <p>Reagents for C: tin granules or pure iron fillings, acidulated water/brine water, methyl red, caustic potash</p> <p>Reagents for S: Ceramic boats/crucibles – desiccators, Fluxes -Low sulphur copper, tin or iron, Dilute hydrochloric acid, Starch Iodide solution, Potassium iodate</p>	<p>cl. 6.1,6.2 –C& S (chemical method, alternative to instrumental method)</p>
3.	<p>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</p> <p>Potassium Permanganate (KMnO₄), Sodium Nitrite (NaNO₂), Ammonium Molybdate [(NH₄)₂ Mo₂O₇], Ammonium Phosphate [(NH₄)₃ PO₄], Potassium Nitrate (KNO₃), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO₄), Sulphurous Acid, Hydrobromic Acid (HBr), other chemicals and reagent as applicable</p>	<p>Phosphorus content Cl 7.1,7.2, 7.3 (chemical method, alternative to instrumental method)</p>

4.	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 7.1,7.2, 7.3 (chemical method, alternative to instrumental method)
5.	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 7.1,7.2, 7.3 (chemical method, alternative to instrumental method)
6.	Determination of Nitrogen by Thermal Conductivity Method/ By Inert gas fusion followed by thermal conductivity detection/ By Steam Distillation Method	Nitrogen Content Cl. 7.1,7.2, 7.3
7.	UTM (0-10kN) Least Count- 0.1N Super Heated Steam Chamber upto-170 ⁰ C, LC-0.1 ⁰ C	Tensile Test cl. 7 Table-3
8.	Torsion testing machine RPM-60Max, Measuring Counter 0-9999 No.s	Torsion Test cl 8
9.	Steel Mandrels (for bend tests)	Bend Test cl.9 Table-4
10.	Measuring Tape (0-2m, LC-1mm)	Bead Wire Test Cl.10
11.	*Coating Testing Machine	Weight of coating cl.11,15.1 Table-5
12.	Micrometer	Dimensions and Tolerances Cl.14
13.	Magnifying glass	Freedom from Defects cl. 13
14.	Adhesion Press Machine Pressure: 0-3000 psi Temperature: 35 to 200 ⁰ C	Adhesion Test cl. 15.2

Nitrogen content shall be occasionally tested.

*** As declared by the manufacturer**

Note: The above is an indicative list for the purpose of guidance only

**ANNEXURE C
TO PRODUCT MANUAL FOR
BEAD WIRE FOR TYRES
According to IS 4824:2006**

SCHEME OF INSPECTION AND TESTING

Page 1 of 4

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 –

The Standard Mark as given in the Schedule of the license and Licence Number (i.e. CM/L.....) shall be incorporated, and the marking shall be done as per the provisions of the Indian Standard, provided always that the product thus marked conforms to all the requirement of the specification. In addition, details of BIS website shall be marked as follows: “For details of BIS certification please visit www.bis.gov.in”

4. CONTROL UNIT – For the purpose of this Scheme, a control unit is defined as wire drawn to same nominal size, finish and manufactured under essentially similar conditions using steel of one cast in a day.

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.

6. TEST CERTIFICATE-For each consignment of BIS Certified material conforming to IS 4824:2006 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/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.

**ANNEXURE C
TO PRODUCT MANUAL FOR
BEAD WIRE FOR TYRES**

Page 2 of 4

TABLE 1: LEVELS OF CONTROL

(1)		(2)	(3)		(4)		
TEST DETAILS			LEVELS OF CONTROL		REMARKS		
Clause	Requirements	Test Method	Test equipment requirement R: required (or) S: Sub-contracting permitted	No. of Samples		Frequency	
		Clause	Reference				
6	Chemical Composition						
	Ladle Analysis	6.1 , Table-1	IS 228 or any other established	R	One	Each Cast	Applicable for manufacturers with steel making facilities.
	Product Analysis	6.2, Table-2	instrumental / chemical method	R	i) Nil	i) Nil	i) Applicable for manufacturers with steel making facilities, wherever traceability to the heat is ensured by manufacturer.
				R	ii) One	ii) Each Cast	ii) Applicable for manufacturers with wire drawing facilities only (see Note-3)
7	Tensile Test	7.1 7.1.1 Table-3	IS 4824: 2006 IS 1608	R	One	Every 5 th Coil	In case the sample fails, the coil from which the sample has been drawn shall be rejected. Sample from the remaining coils in the control unit shall be drawn and tested and only those coils which conform shall be marked with the Standard Mark.
8	Torsion Test	8	IS 4824: 2006 IS 1717	R	-do-	-do-	
9	Bend Test	9, Table-4	IS 4824: 2006 IS 1716	R	-do-	-do-	
10	Bead Wire Test	10	IS 4824: 2006	R	-do-	-do-	
11	Weight of Coating	11,15.1, Table-5	IS 4824: 2006	R	-do-	-do-	

12	Protective coating	12	IS 4824: 2006	R	If agreed to between purchaser and the supplier.		
13	Freedom from Defects	13	IS 4824: 2006	R	Adequate inspection to ensure that finished wire shall be circular in section and free from scales, splits, spills and other harmful defects.		
14	Tolerances on sizes	14	IS 4824: 2006	R	One	Every Coil	
15	Adhesion test	15.2, Annex-A	IS 4824: 2006	R	One	Every 5 th Coil	Values agreed to between manufacturer & purchaser shall be maintained.
16	Packing	16	IS 4824: 2006	R	Suitably packed as agreed to between the purchaser and the 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 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 for product analysis is required if wire rods fed to wire drawing unit is ISI marked and received with test certificate.

ANNEXURE I**Page 4 of 4**

(Para 6 of the Scheme of Inspection and Testing)

XYZ IRON AND STEEL COMPANY

(Registered office Address and works address)

TEST CERTIFICATE FOR BEAD WIRE FOR TYRESBIS
STANDARD
MARK

TEST CERTIFICATE No. _____

DATE _____

To M/s _____

We certified that the material described below fully conforms to 4824:2006 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 4824:2006 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	(nom Size)	Control Unit No.	finish	Quantity (in tonnes)	CHEMICAL COMPOSITION						MECHANICAL PROPERTIES				Bend test	Adhesion test	Weight of coating	Torsion test
					C %	S %	P %	Si %	Mn %	Al %	BL	TS	% elongation	Proportional limit				

REMARKS

WAGON NO.

TRUCK NO.

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

FOR XYZ IRON AND STEEL COMPANY