

**PRODUCT MANUAL FOR  
Mild Steel Wire for General engineering Purposes  
According to IS 280:2006**

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.	<b>Product</b>	:	<b>IS 280:2006</b>
	<b>Title</b>	:	Mild Steel Wire for General engineering Purposes
	<b>No. of amendments</b>	:	1
2.	<b>Sampling Guidelines</b>		
a)	<b>Raw material</b>	:	Wires shall be drawn from Wire rods conforming to IS 7887 or any other specifications which meet the requirements of IS 7887.
b)	<b>Grouping Guidelines</b>	:	Please refer Annex – A
c)	<b>Sample Size</b>	:	For mechanical test: 10 meters For chemical test : 5 meters
3.	<b>List of Test Equipment</b>	:	Please refer Annex – B
4.	<b>Scheme of Inspection and Testing</b>	:	Please refer Annex – C
5.	<b>Possible tests in a day</b>	:	All mechanical and chemical tests
6.	<b>Scope of the Licence :</b>		
	Licence is granted to use Standard Mark as per IS 280:2006 with the following scope:		
	<b>Name of the product</b>	Mild Steel Wire for General engineering Purposes	
	<b>Size</b>	0.125 mm to 12.5mm Diameter	
	<b>Condition</b>	Annealed, ...	
	<b>Finish</b>	Galvanized, ..	

**ANNEXURE A**  
**TO PRODUCT MANUAL FOR**  
Mild Steel Wire for General Engineering Purposes  
**According to IS 280:2006**  
**GROUPING GUIDELINES**

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**Mild Steel Wire for General Engineering Purposes according to IS 280:2006 are designated as per the following:**

- Diameter from 0.125mm to 12.5mm (Cl 7)
- Condition (Cl 9.1)
- Finish (Cl 10)

1. Samples to be drawn for independent testing are as under:

- i) For Size (Cl-7):- For covering wires of all sizes in the range, samples of lowest and highest sizes of wires intended to be covered under the scope of licence is to be drawn and tested.
- ii) For Finish (Cl-10):- For covering finishes for coated wires such as galvanized, coppered, and tinned, samples of any of the finish galvanized/coppered/tinned is to be drawn and tested. If samples of coated wires are drawn and tested, other finishes involving uncoated wires (Annealed, bright drawn/dry drawn) may also be covered. For covering other finishes alone, involving uncoated wires (Annealed, bright drawn/dry drawn), samples of any of these finishes is to be drawn and tested.

Note: In case of tin or copper coated wires, declaration, as applicable, is to be obtained for test method followed for testing the coating requirements against the agreed upon values between the purchaser and the manufacturer.

- iii) For Condition (Table-2):- For covering the conditions annealed & soft drawn one sample of either annealed or soft drawn is to be drawn and tested. For covering the conditions hard, ½ hard & ¼ hard one sample of hard is to be drawn and tested. If the sample drawn is of ½ hard then both ½ hard & ¼ hard can be covered.
2. While considering Grant of licence/inclusion of additional varieties, it shall be ensured that the applicant/licensee has got complete manufacturing and testing facilities for all the sizes/finishes/conditions applied.
3. During the operation of license, BO shall ensure that all the sizes/finishes/conditions conditions covered in the licence are drawn for independent testing on rotation over a period of time.

**ANNEXURE B**  
**TO PRODUCT MANUAL FOR**  
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**According to IS 280:2006**

**LIST OF TEST EQUIPMENTS**

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

Sr. No	Test Equipment/Chemicals	Tests Used in with Clause Reference
1	Micrometer	Cl 7,8 (Diameter & Tolerances)
2	Tensile Testing Machine	Cl 9.1 (Tensile Strength)
3	Wrapping Test Machine, 10X magnifying glass, mandrels of suitable sizes ( 8 times diameter of wire)	Cl 9.2 (Wrapping Test)
4	Any testing machine or arrangement to bend the wire through an angle of 90 <sup>0</sup> round a former of diameter equal to twice of diameter of wire being tested, Angle Protractor	Cl 9.3(Bend Test)
4	Rough Polishing Machine Cutting Machine, Fine Polishing Machine Grinder Machine	Cl 5 ( chemical composition) Preparation of specimen
5	Weighing balance, Clean soft cotton cloth, Vernier Caliper, micrometer	Cl 11.3(Mass of Zinc Coating)
6	Stripping method: Antimony trioxide / Antimony tri chloride, Conc.HCl,soft cotton cloth, solvent naphtha, trichloroethylene, alcohol, Distilled Water.	
7	100 ml glass burette with stopcock, rubber tube, reservoir (for Volumetric method for using below 5mm nominal dia) and other glassware as applicable in addition to the reagents mentioned above.	
8	Copper carbonate (laboratory grade) or Copper hydroxide ( laboratory grade ), Copper Sulphate Crystals – Technical grade, Ammonium Hydroxide, Alcohol, Distilled water, Volatile organic solvent such as ether, trichloroethylene, carbon tetrachloride, etc. and other chemicals and reagents applicable	Cl 11.2 (Uniformity of Zinc Coating)
9	Room Air conditioner with temperature control facility	
10	Thermometer, hydrometer	
11	Adhesion Testing Machine (rate not more than 15 turns per minutes), mandrels of suitable sizes ( as per Table-3 of IS 4826), Angle Protractor	Adhesion test
12	<b>Instrumental methods</b> Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry.  Spectrophotometer	Cl 5 for C,S,P,Mn,Si,Cu,Al  Mn,S,P,Si

13	<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 5 for C&amp; S (chemical method, alternative to instrumental method)</p>
14	<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 (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</p>	<p>Cl 5 Phosphorus content (chemical method, alternative to instrumental method)</p>
15	<p>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</p>	<p>Cl 5 Manganese content (chemical method, alternative to instrumental method)</p>
16	<p>Medium textured filter paper, Porcelain casserole, platinum crucible,filter paper pulp, hot plate, hot air oven, muffle furnace</p> <p>Reagents: Silver nitrate solution, concentrated nitric acid, concentrated sulphuric acid, Dilute Hydrochloric Acid, Dilute Sulphuric Acid, Perchloric Acid, Tartaric acid and hydrofluoric acid</p>	<p>Cl 5 Silicon content (chemical method, alternative to instrumental method)</p>
17	<p>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>	<p>Cl 5 Cu content (chemical method, alternative to instrumental method)</p>
18	<p>Vision-based inspection system</p>	<p>13(freedom from defects)</p>

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

**ANNEXURE C**  
**TO PRODUCT MANUAL FOR**  
Mild Steel Wire for General Engineering Purposes  
**According to IS 280:2006**

**SCHEME OF INSPECTION AND TESTING**

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**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. LABELLING, MARKING & PACKING** – The Standard Mark as given in 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, details of BIS website shall be marked as follows: “For details of BIS certification please visit [www.bis.gov.in](http://www.bis.gov.in)”

**4. CONTROL UNIT** – All coils of mild steel wires for general engineering purposes manufactured from same cast of wire rod in a day under uniform conditions of production.

**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 280:2006 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.

**ANNEXURE C**  
**TO PRODUCT MANUAL FOR**  
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**SCHEME OF INSPECTION AND TESTING**

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**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				
5 & 6	Manufacture & Chemical Composition	5 & 6	IS 280: 2006, IS 228 (various parts) & IS 7887	R	1	Each Cast	No testing is required in case each consignment of material used for wire drawing is ISI marked and received with test certificate.
7 & 8	Dimension & Tolerances	7.1, 7.2, 8 & Table-1	IS 280: 2006	R	1	Each coil	
9	MECHANICAL PROPERTIES						
9.1	Tensile Test	9.1, Table-2	IS 280: 2006 IS 1608	R	1	1 in every 5 coils or part thereof for each control unit	
9.2	Wrapping test	9.2	IS 280: 2006 IS 1755	R	1	-do-	Applicable for wires smaller than 5mm dia
9.3	Bend test	9.3	IS 280: 2006	R	1	-do-	Applicable for wires of dia 5mm and above

11	Coating Test						
	i) Zinc Ingots	11.1	IS 209 IS 13229 IS 4826	S	1	Each Consignment	i) See Note-3
	ii) Zinc Anodes		IS 2605	S	1	Each Consignment	ii) Recommended in continuous electro-galvanizing plants
	Uniformity of Zinc Coating	11.1	IS 2633 IS 4826 IS 12753	R	1	1 in every 5 coils or part thereof for each control unit	
	Mass of Zinc Coating	11.1	IS 6745 IS 4826 IS 12753	R	1	-do-	
	Adhesion test	11.1	IS 4826	R	1	-do-	i) for hot dip galvanized coatings
			IS 12753	R	1	-do-	ii) for electro-galvanized coatings
Tinned /Coppered	11.2	IS 280: 2006	R	As agreed between the manufacturer and the purchaser.			
13	Freedom from defects	13	IS 280: 2006	R	Adequate inspection to ensure that finished wires are sound and free from defects.		

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: In case material is not ISI marked or there exists no third party laboratory for testing of the product each consignment is to be accompanied by raw material manufacturer's test certificate.

**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 Mild Steel Wire for General Engineering Purposes**

BIS  
STANDARD  
MARK

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

DATE \_\_\_\_\_

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

We certified that the material described below fully conforms to 280:2006 Chemical composition and Mechanical 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 280:2006 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

**TEST RESULTS**

Order No. & Date	(Nom Dia)	Control Unit No.	Finish	Qty	CHEMICAL COMPOSITION							COATING TEST			Tensile Strength	Wrapping test	Bend test
					C %	S %	P %	Si %	Mn %	Cu* %	Al %	Mass of coating	Uniformity of coating	Adhesion test			

\*if required by purchaser

REMARKS

WAGON NO.

TRUCK NO.

FOR XYZ IRON AND STEEL COMPANY

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